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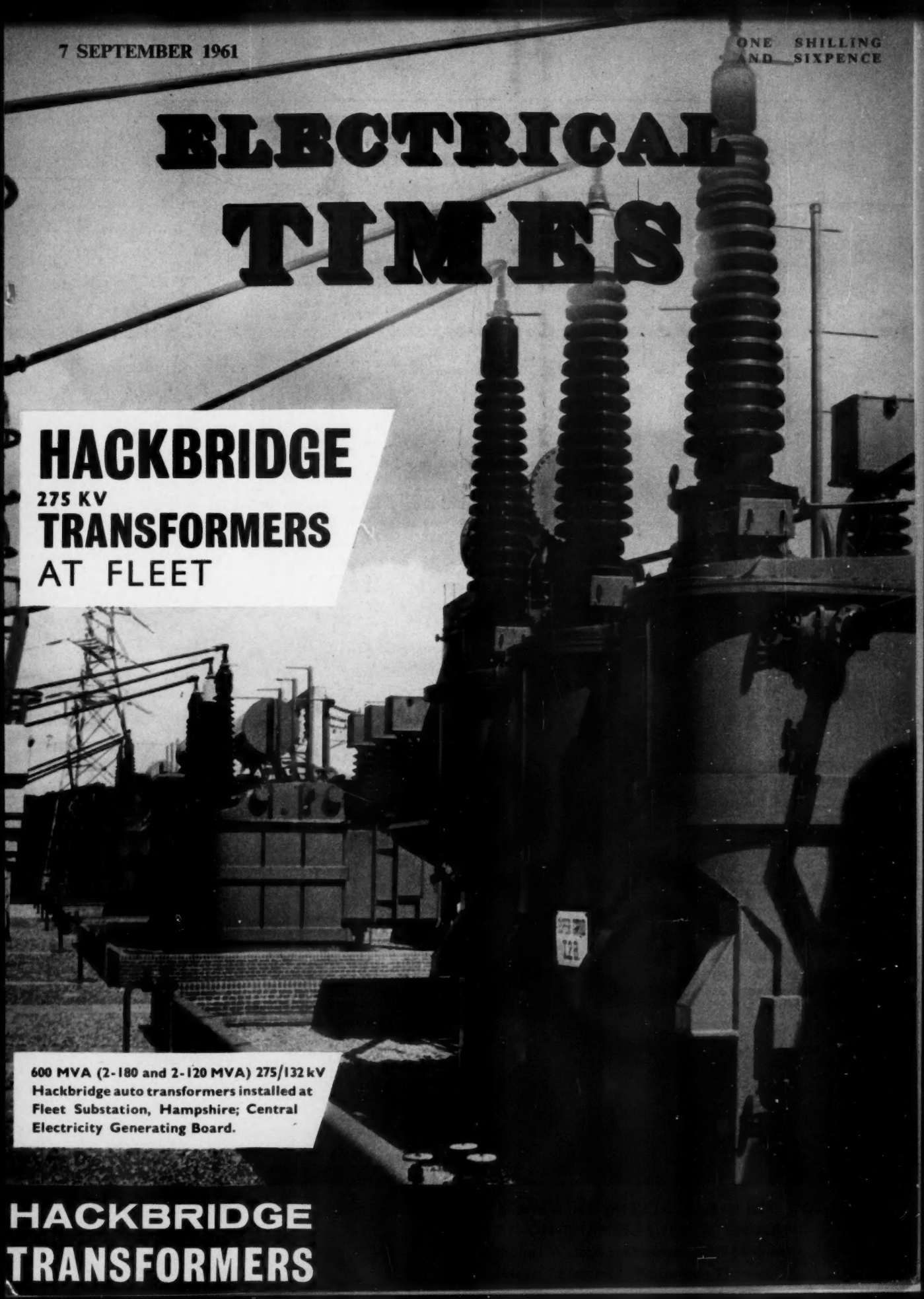
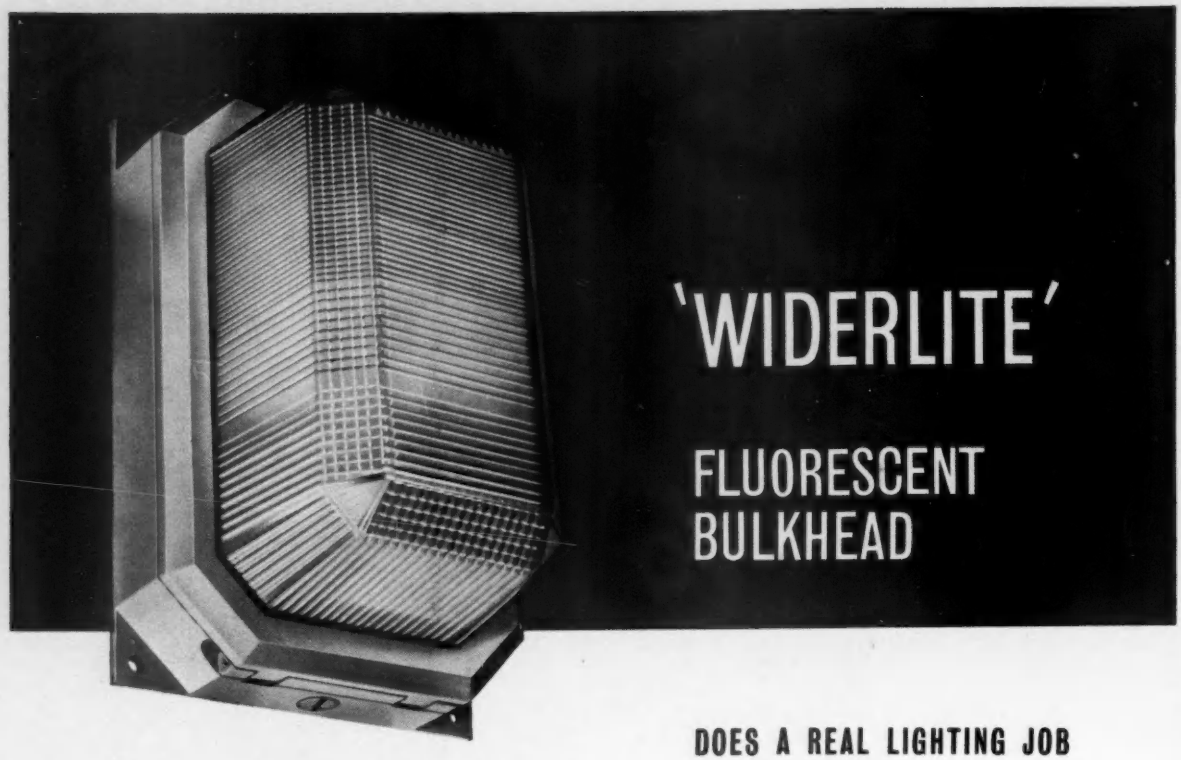
HACKBRIDGE 275 KV TRANSFORMERS AT FLEET



600 MVA (2-180 and 2-120 MVA) 275/132 kV Hackbridge auto transformers installed at Fleet Substation, Hampshire; Central Electricity Generating Board.

HACKBRIDGE TRANSFORMERS



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(Holophane do not supply the lamps)

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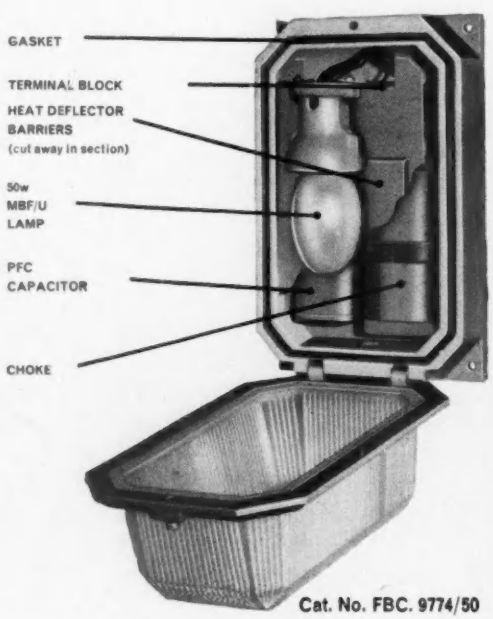

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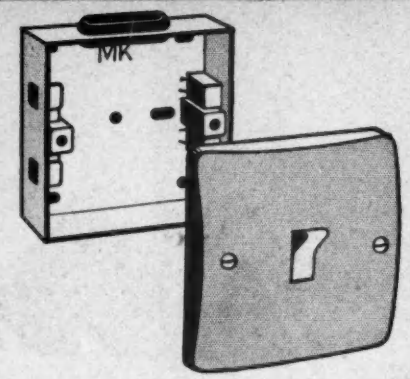

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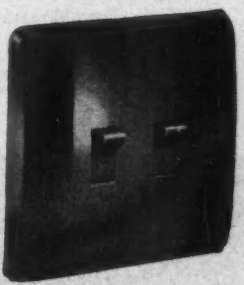
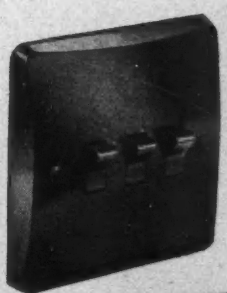
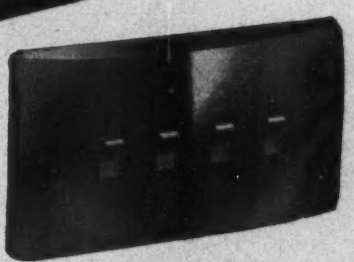


List No. 4822
Two gang with 2¾" fixing centres



List No. 4833
Three gang with 2¾" fixing centres



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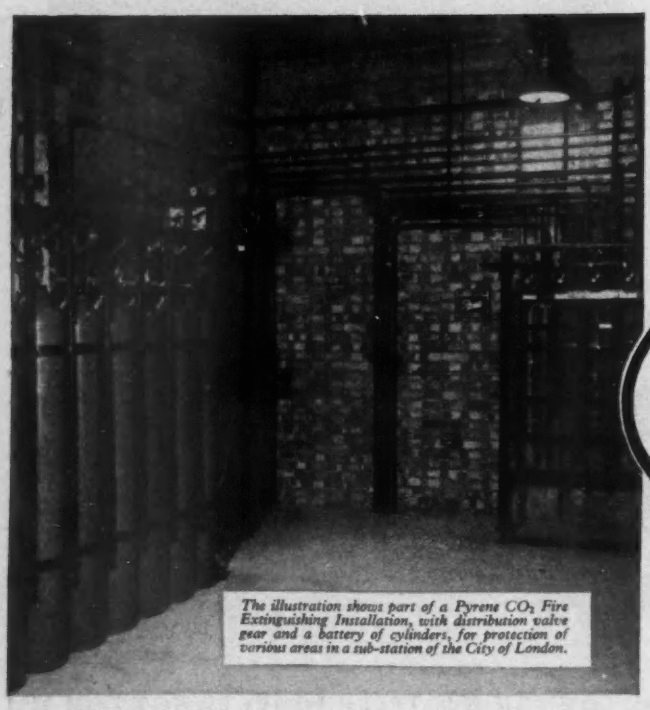

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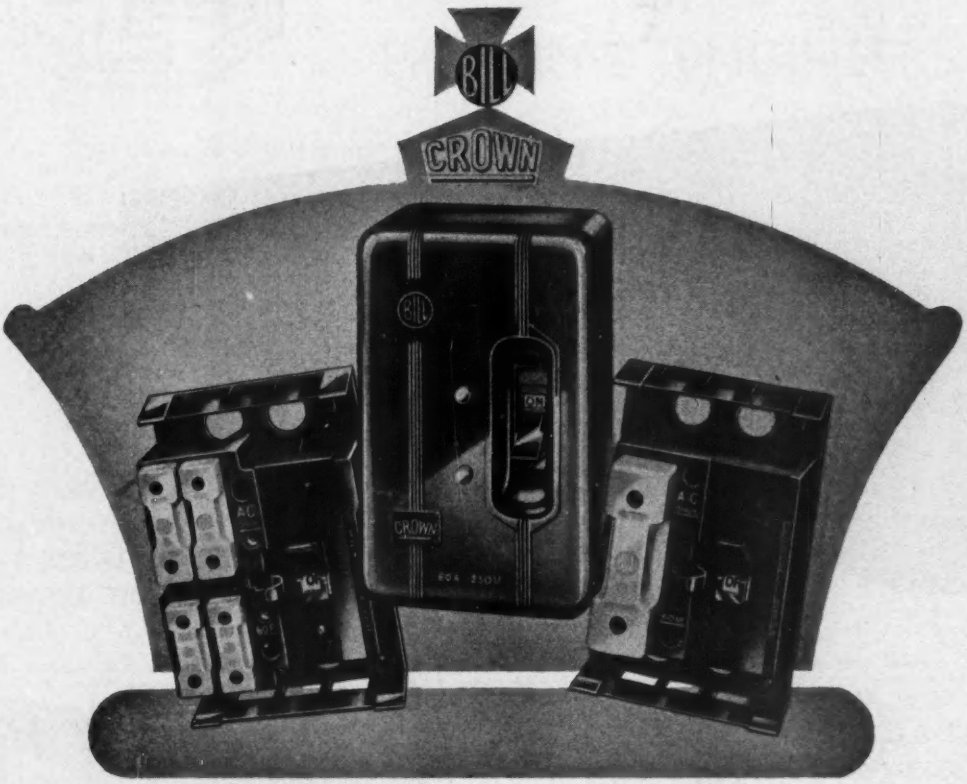

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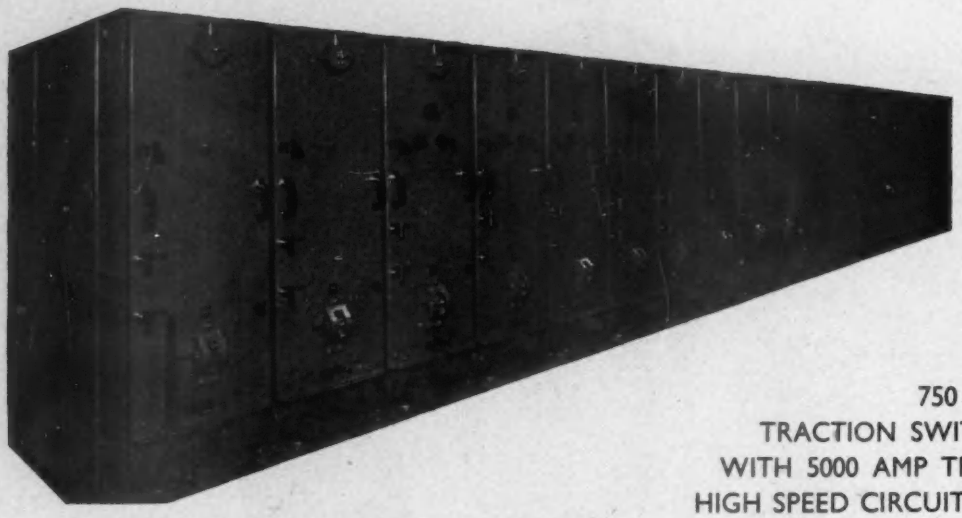

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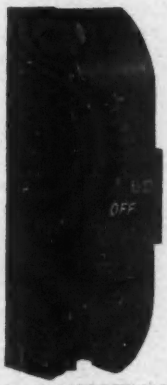

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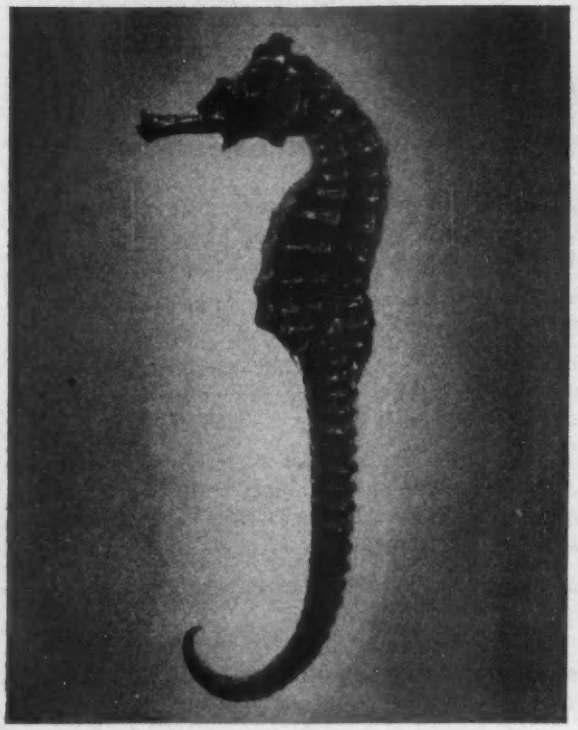

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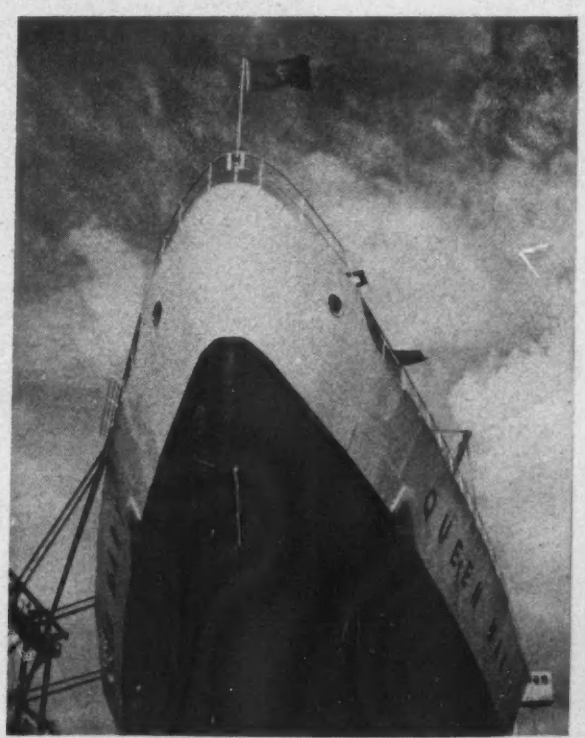

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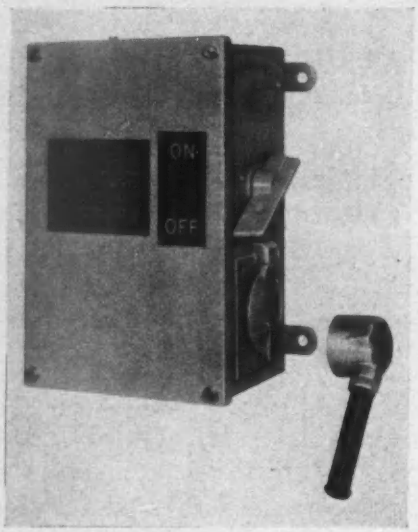

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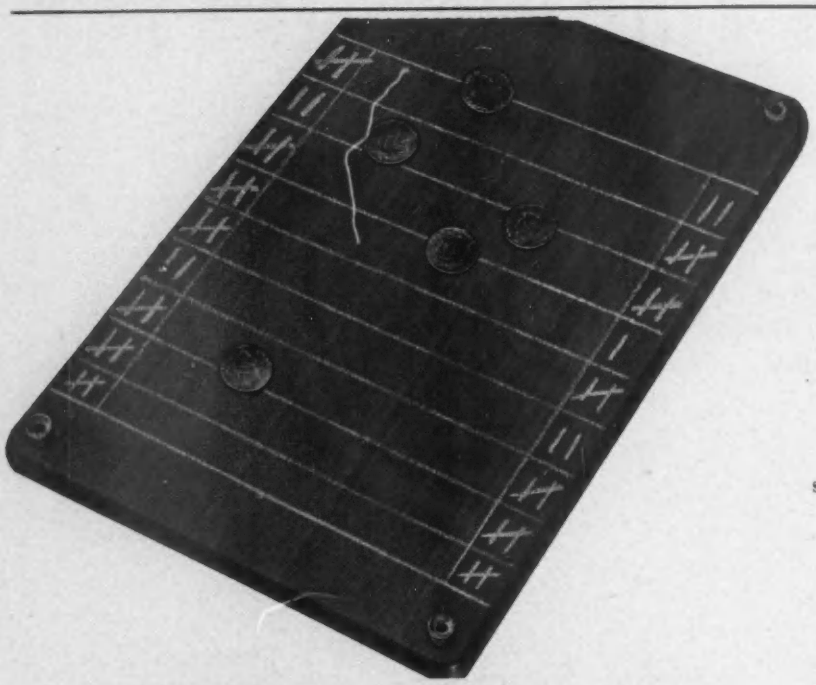

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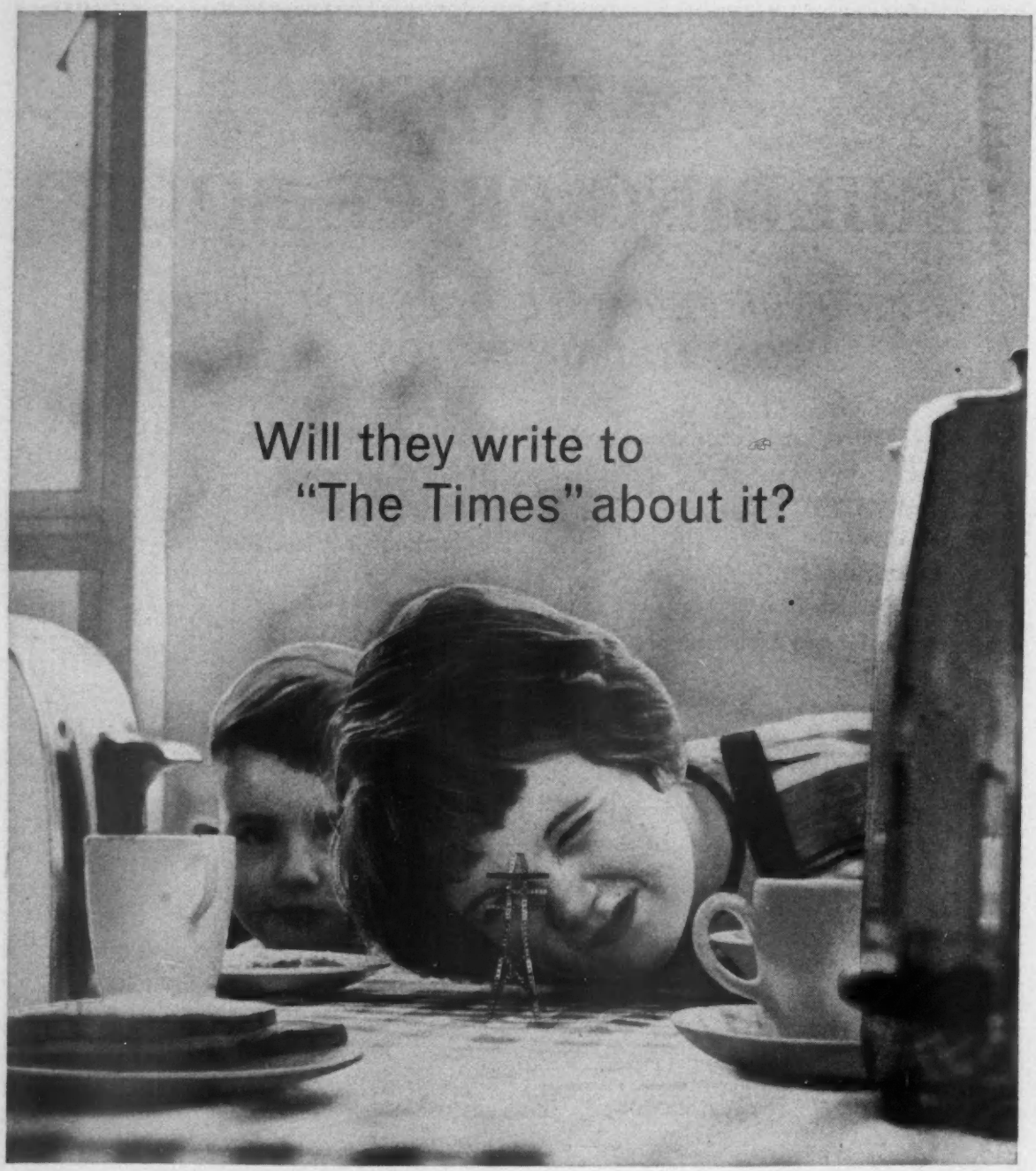

By the time these children are ten years older, Britain's power demands will have doubled. But the number of transmission towers will *not* have doubled. On the contrary — because the Central Electricity Generating Board is adopting 400,000 volt transmission, fewer new towers will be needed. The new power system will use some existing towers, suitably reinforced, and a limited number of new, slightly taller ones. By Act of Parliament, the C.E.G.B. must provide an efficient, economical electricity supply, while preserving visual amenity as far as possible.

■ **These advertisements are appearing in the farming and country magazines. The Central Electricity Generating Board thank electrical contractors for their co-operation in the past, and know that they will do all they can to preserve the amenities of the countryside.**

C E G B

who make and supply electricity to 12 Area Electricity Boards in England and Wales (which re-sell to consumers) and British Railways.

Write for a copy of "Preserving Amenities" to The Central Electricity Generating Board, 76, Wimsley Street, London, W.1

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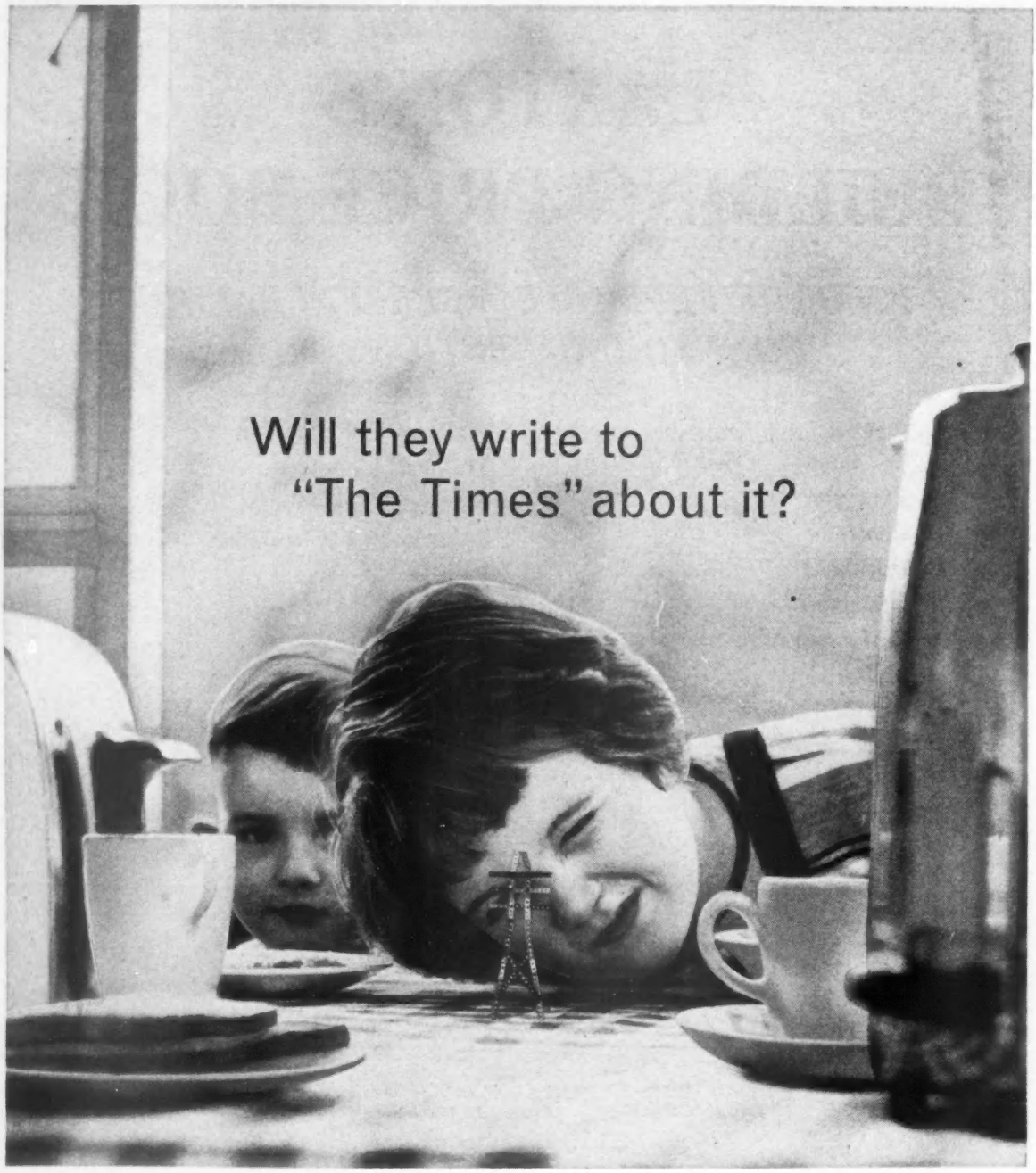

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All the elements of a first class electric cooker

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TO THE DESIGN ENGINEER we offer modern design and research facilities backed by years of specialised element production.

TO THE SERVICE ENGINEER we offer quick delivery of standard 8" and 6¼" Single and Three-Heat E.D.A. Radiant Boiling Plates, complete with either Aluminium or Vitreous enamelled reflectors.

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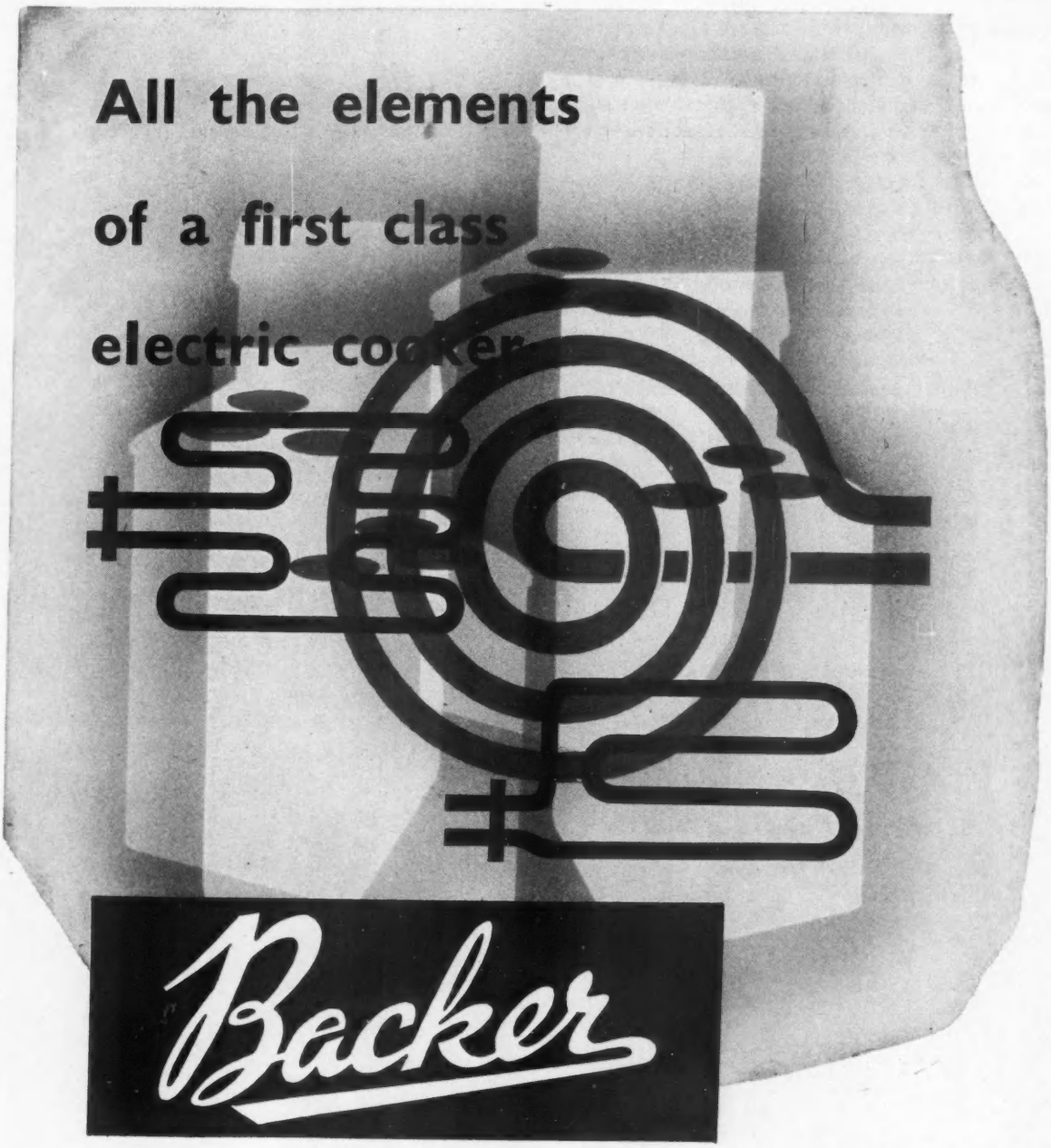

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Danger surrounds creatures of the fields and forests. Nature has equipped them to sense it, to be alert to every slightest warning and to take evasive action—on the instant.

In all the years since man first harnessed electricity he has relied on *porcelain* for protection against its hazards. Most widely used insulation material in the industry, porcelain is both versatile and economical.

WADE porcelain has an unsurpassed reputation for accuracy and dependability.

WADE technicians are at your service to go anywhere at anytime. Your enquiries are welcomed and will receive immediate attention.

Think fast Mister Hare!

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BRITISH ELECTRICAL CERAMIC MANUFACTURERS ASSOCIATION

WADE

ELECTRO-CERAMICS

Geo. Wade & Son Ltd., Burslem, Stoke-on-Trent
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PORCELAIN FOR INSULATION....WADE FOR PORCELAIN

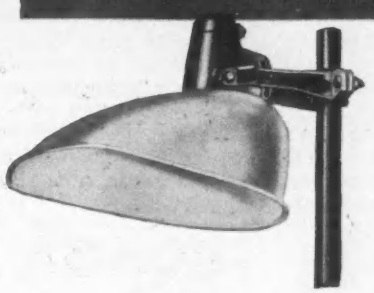
If it's a question of lighting . . . leave it to Simplex

Notice we say lighting — not lighting fittings. We supply the right lighting equipment for a diversity of industrial applications. But, you are interested in the end, not the means. You want the right amount of light in the right place at the right time. And once the job is done you want to forget it.

So like so many people nowadays, you call in Simplex first. After all, it's only common sense to ask the experts in industrial lighting how your objective can best be achieved, which type of light fittings are ideal for the job, how many you need, where they should be located. There is no obligation of course.

Here's what to do: Reach for your telephone book. Look up your local Simplex branch. Ask them to send someone round for an informal discussion.

1 Simplex Blended High-Bay Fitting
2 Simplex Fiesta Flood
3 Simplex Wall Bracket Screwglass Fitting
4 Simplex Dispersive Reflector
5 Simplex ACF (Anti-corrosion Fluorescent) Fitting

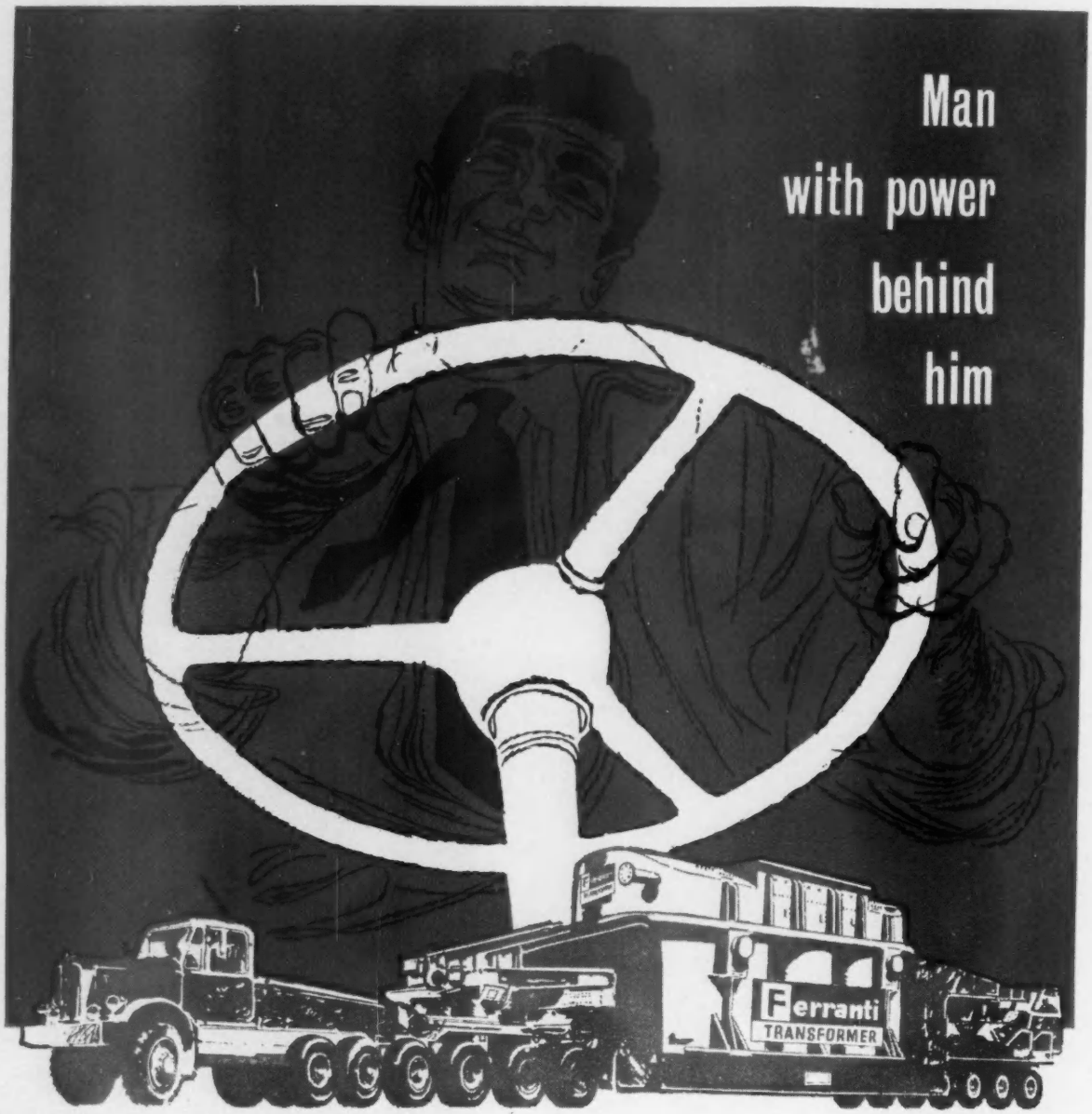


Simplex

SIMPLEX ELECTRIC COMPANY LIMITED
CREDA WORKS, BLYTHE BRIDGE, STOKE-ON-TRENT, STAFFS.
Branches throughout Great Britain and Agents throughout the World

Detailed literature available on request

ELECTRICAL DIVISION L.11



Man with power behind him sees a bright new future ahead. A bright future . . . a warm future . . . and a comfortable one as well, in fact—because the man with a giant Ferranti transformer behind him is helping to bring the benefits of a new electrical age to hundreds of industries and thousands of homes. Incidentally, *giant* transformer, did we say? Not an exaggerated description, surely, for an iron-clad object as big as a house and weighing all of 180 tons? Other Ferranti giants recently delivered are already in action at Niagara, at the Kariba Dam and the British National Grid.

As you might suspect, not all Ferranti transformers are this large, of course. Those in many modern aircraft weigh only a few ounces—and Ferranti technicians are constantly experimenting to make each of their many types smaller, quieter and easier to transport. Ferranti have always been pioneers. In engineering . . . the aircraft industry . . . scientific establishments . . . business organisations . . . in all of these, Ferranti products are hard at work. And Ferranti research continues . . .

FERRANTI

First into the Future

Ferranti Ltd., Head Office: Hollinwood, Lancs. London Office: Kern House, 36 Kingsway, W.C.2.

. . . A TOTALLY-ENCLOSED REEDED DIFFUSER WITH END-PLATES IN colour

Here's lighting with a new look for stores and offices . . . a range of beautifully finished fittings combining the quality of 'New-Range' with a choice of three colours for the dished end-plates. The reeded opal plastic diffusers spring easily into position on the standard 'New-Range' chassis, and form a close dust-tight fit all round it. In 5ft. or 4ft. sizes, one or two lamp fittings with end-plates in red, primrose, or cerulean blue enamel; high power factor switch-start or snap-start control gear, and spring-loaded bi-pin lampholders.

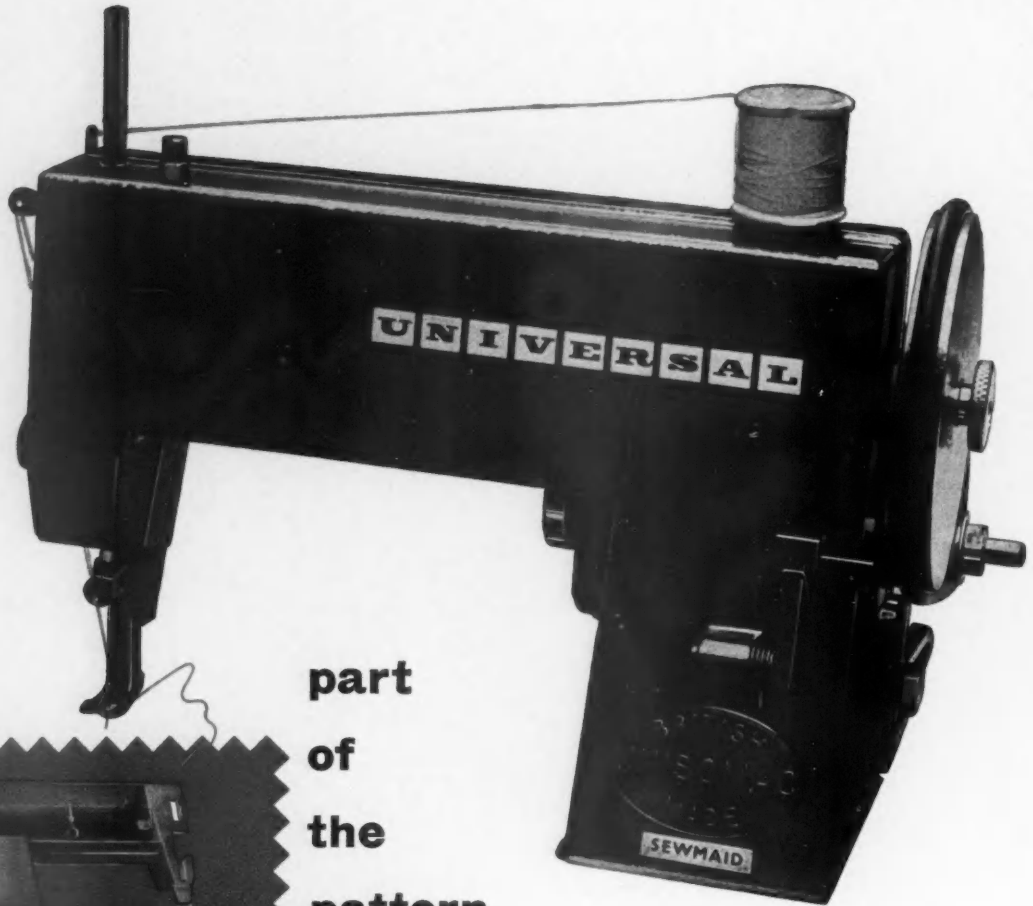
By Appointment
To Her Majesty The Queen
Manufacturers of
Electric Lamps

Crompton 'New-Range'

ELECTRICAL EQUIPMENT

FLUORESCENT LIGHTING FITTINGS

CROMPTON PARKINSON LTD., CROMPTON HOUSE, ALDWYCH, LONDON, W.C.2.



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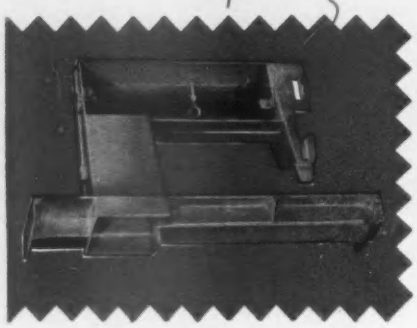


Body and base plate pressure die cast complete as one unit in aluminium alloy for Universal Sewing Machines Ltd

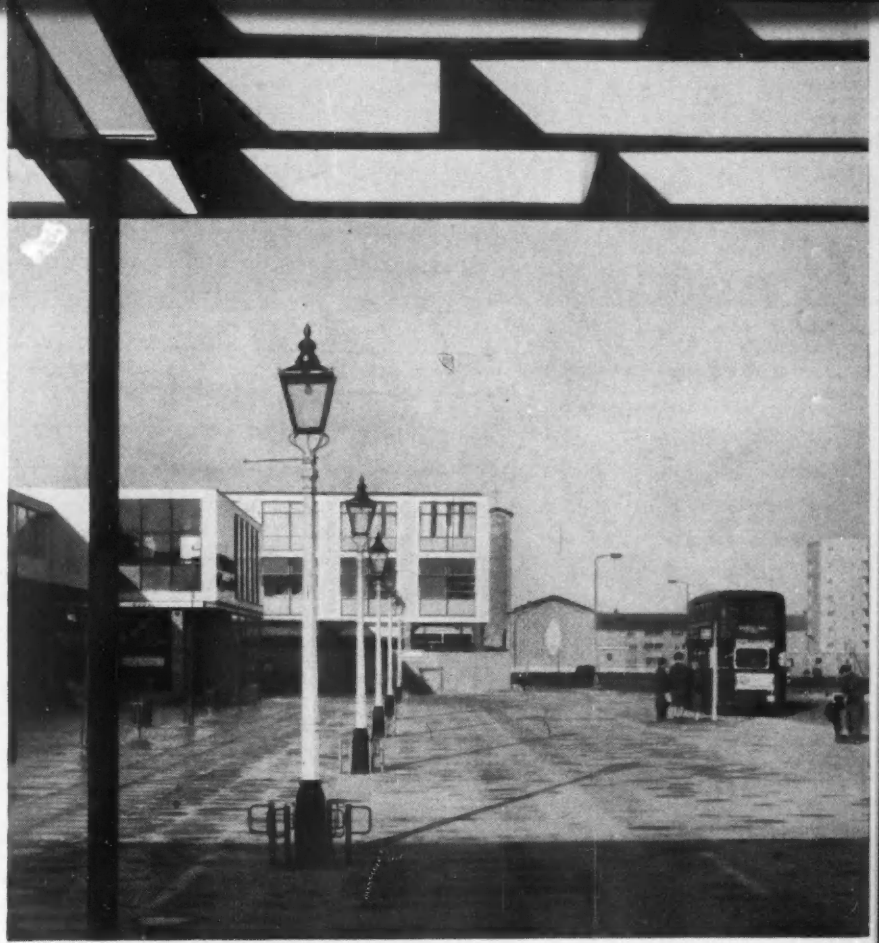
THE SEWING MACHINE...
a recurring feature of the British domestic scene.
And like countless other worthwhile products
it embodies castings made by Birmal.
Dependable Birmal! As necessary in their way
as stitches in a well made garment,
and as seldom in the public eye.
For more than 50 years Birmal skill has set the pattern
for so many first class castings...
in sewing machines and motor cars,
in nuclear engineering and aeroplanes.
And for many years to come,
Birmal will continue to be relied on
wherever the quality of castings counts.

BIRMAL

Birmingham Aluminium Casting (1903) Co. Ltd

BIRMID WORKS SMETHWICK 40 STAFFS

Modern Cheltenham



Part of the new shopping centre

St. Aidan's Church

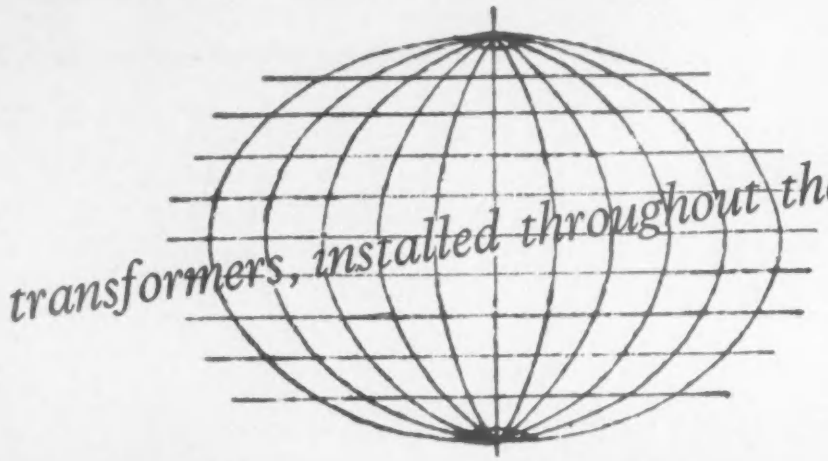
Wired with BICC M.I Cables

Thousands of yards of BICC mineral insulated copper sheathed cables have been installed in the new development areas of Cheltenham.

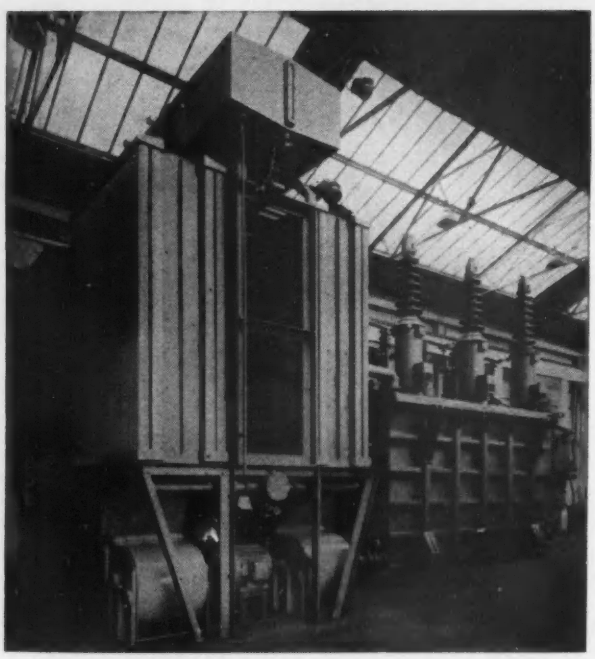
BICC M.I. Cables are fireproof, waterproof, mechanically tough and non-ageing. They are quickly and neatly installed at low cost and can be supplied cut to length, fitted with terminations.

Wiring Cables for every type of electrical installation are available from fifty BICC Branch Offices throughout the country.

British Insulated Callender's Cables Limited, 21 Bloomsbury Street, London, W.C.1



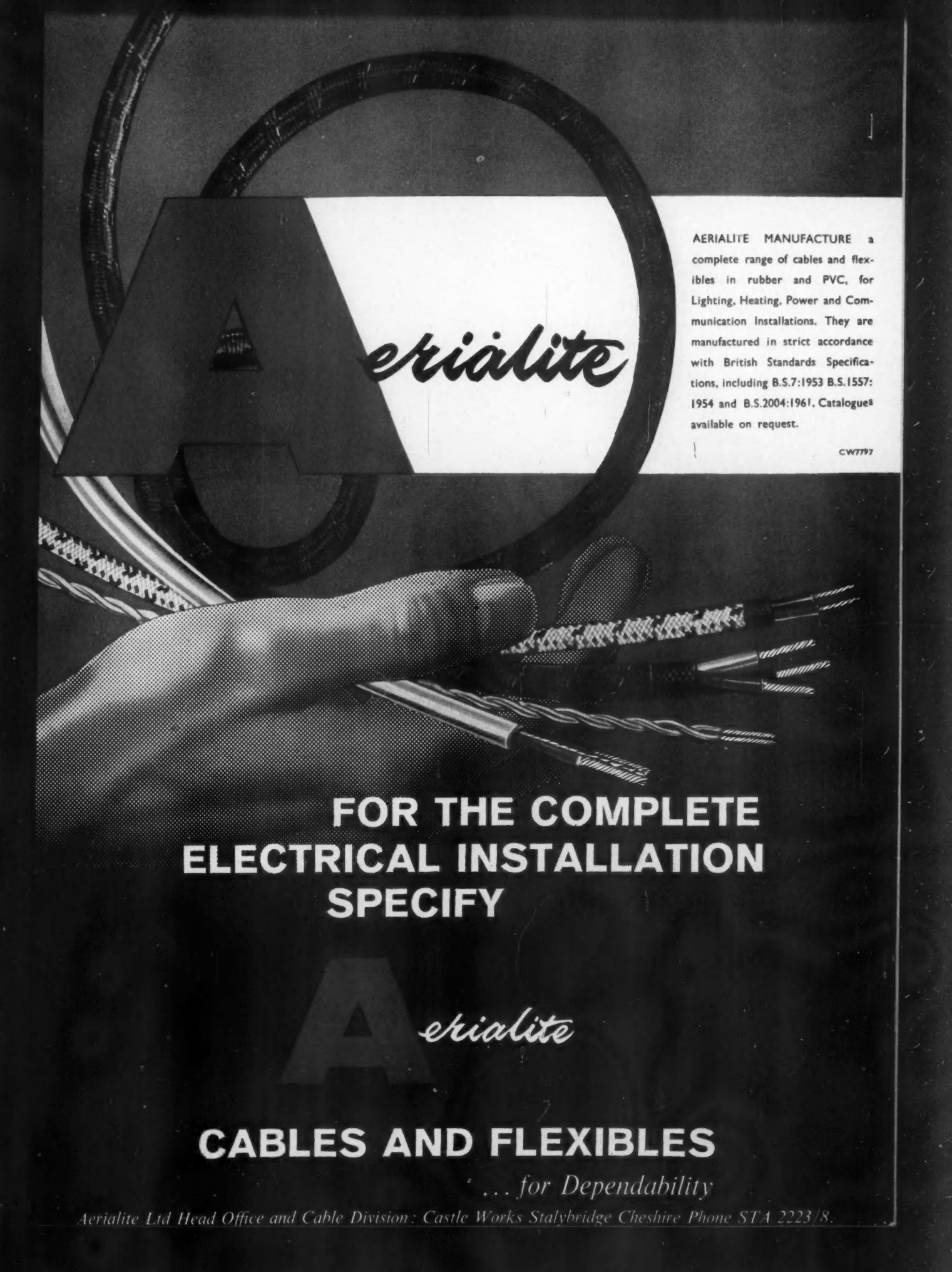
YORKSHIRE TRANSFORMERS



132kV

YORKSHIRE

YORKSHIRE ELECTRIC TRANSFORMER CO. LTD.,
THORNHILL, DEWSBURY, YORKS. TEL: 1691-2 'GRAMS: 'TRANSFORMA, DEWSBURY'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AERIALITE MANUFACTURE a complete range of cables and flexibles in rubber and PVC, for Lighting, Heating, Power and Communication Installations. They are manufactured in strict accordance with British Standards Specifications, including B.S.7:1953 B.S.1557: 1954 and B.S.2004:1961. Catalogues available on request.
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FOR THE COMPLETE ELECTRICAL INSTALLATION SPECIFY
Aerialite
CABLES AND FLEXIBLES
... for Dependability
Aerialite Ltd Head Office and Cable Division: Castle Works Stalybridge Cheshire Phone STA 2223/8.

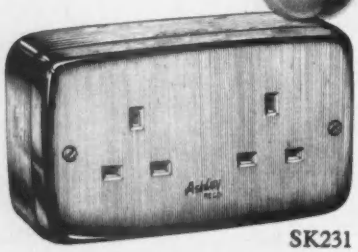
HAVE THE Ashley 13 AMP RANGE AT YOUR FINGERTIPS

All products illustrated are typical examples of the Ashley 13 amp. range, which are to relevant British Standard. Smooth Contour styling in Brown or Cream; Heavy Duty in Black.

Particular attention is given to users' safety, e.g. the Ashley 13 amp. Switchsocket has a "safety switch" (second switch in series with dolly switch) automatically preventing plug pin from becoming alive until almost home.

Accepted by the Council of Industrial Design for "Design Index".

Descriptive literature giving complete details will be forwarded at your request.

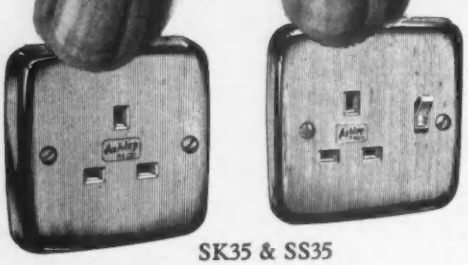


SK231

Twin Socket & 'Pattrebox'

Surface: Integral with 'Pattrebox' widely adaptable to suit a variety of new and conversion installation requirements in PVC, TRS and MICC Cable. Apply for fully descriptive pamphlet.

Flush: Plaster depth or deep box applications, centralised common L N & E terminals.



SK35 & SS35

Single Way Sockets & Switchsockets

Surface: With Pattress and optional back plate for compliance with IEE Reg. 207G.

Flush: For mounting in plaster depth or deep socket boxes.

Switch Action: A.C. Slow break, quiet smooth dolly switch, and 'Ashley Safety Switch' in series.

PG13

13 amp. Fused Plugs

Fingergrip. Large terminals clearly marked. Quickly wired with cable cores cut as one length. Adjustable saddle firmly grips round flexible cable. With 13 amp. cartridge fuse link or, if specified, 2, 5 or 10 amp. Visible earth connection. Captive cover screw.

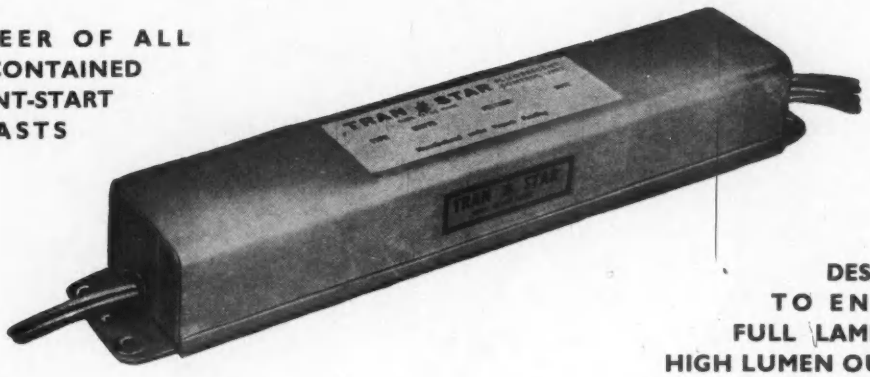
Installation All products of the range possess generous and effective Knockouts, Terminals, Wiring Space and Fixings compatible with modern requirements.

ASHLEY ACCESSORIES LIMITED, Ulverston, Lancashire, England. Telephone: Ulverston 3333. Telegrams: Ashley, Ulverston

TRANSTAR

LIGHTING CONTROL UNITS

PIONEER OF ALL
SELF-CONTAINED
INSTANT-START
BALLASTS



DESIGNED
TO ENSURE
FULL LAMP LIFE
HIGH LUMEN OUTPUT
SILENT OPERATION

FITTED WITH HIGH TEMPERATURE RESISTING CAPACITORS
AND
GUARANTEED FOR 3 YEARS

Sole Manufacturers
INDUCTIVE APPLIANCES LTD., ST. NICHOLAS STREET, NEWCASTLE UPON TYNE 1
Tel. Newcastle 27069 **Works Tel. Hebburn 832221**

Not long ago, many people thought it impossible to get D.C. motors quickly and at a reasonable price. Some people still think so. They don't know about E.P.E. E.P.E. specialise in D.C. equipment, combining their many years experience in this field with a keen interest in new techniques. They can supply D.C. motors and generators of any enclosure quickly and at a reasonable price. If you've a D.C. motor problem, why not bring it along to E.P.E.? If they haven't a solution in stock, they'll be happy to make one for you!

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Phone: STEchford 2261. Grams: Torque Phone B'ham.
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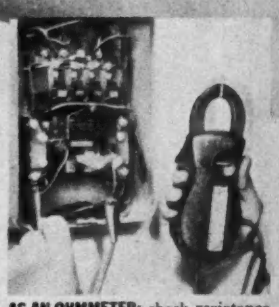
ONLY ONE SNAP-AROUND TESTS ALL THREE!

AMPROBE RS-3

THE AMPROBE RS-3 is the *only* pocket-sized, snap-around test instrument that measures voltage, amperage *and* resistance. Designed for one-hand operation, the RS-3 accurately locates opens and shorts, sets overload relays, balances loads, determines low- or high-voltage conditions...in fact, it handles up to 99% of *all* your test needs!

The rugged, lightweight AMPROBE RS-3 meets every commercial voltage requirement on three voltage scales: 0-150/300/600 volts AC. It also has five current ranges from 0 to 300 amps, and a resistance scale with a mid-range reading of 25 ohms. The readings are taken from a *rotary* scale...it reveals only one range at a time to increase reading speed, minimize chance of error. The RS-3 comes complete with test leads, ohmmeter attachment, genuine cowhide leather carrying case, and a *one-year guarantee* against defects in parts or workmanship. See your distributor or write today for more information. **only £ 20-12-0**

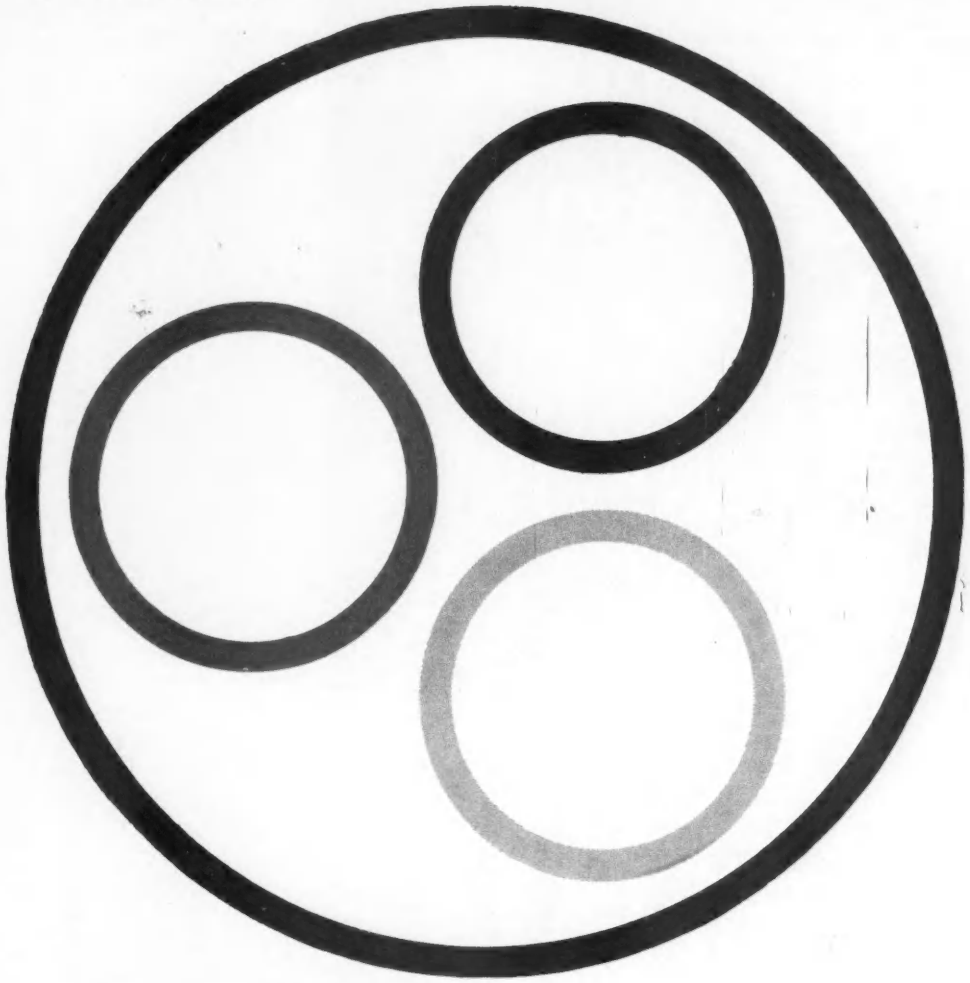
AS AN AMMETER: snapped around conductors to balance circuits.



AS AN OHMMETER: check resistance of motor control solenoid coil.

AS A VOLTMETER (large photo): check voltage on slipring of motor.

PYRAMID INSTRUMENT CORPORATION, U. K. SALES DIV.: H. J. BALDWIN & CO. LTD., VICTORIA MILLS GAMBLE ST., NOTTINGHAM



Mains Cables
Plastic Power Cables
Mining Cables

Engineers throughout the electrical and mining industries rely on Glovers Cables, in an ever increasing extent, to provide the vital link between the power station and the supply point. To meet their growing responsibilities these discerning users know that they are installing cables of the highest quality. You, also, can buy with confidence from Glovers — the oldest name in cable making.

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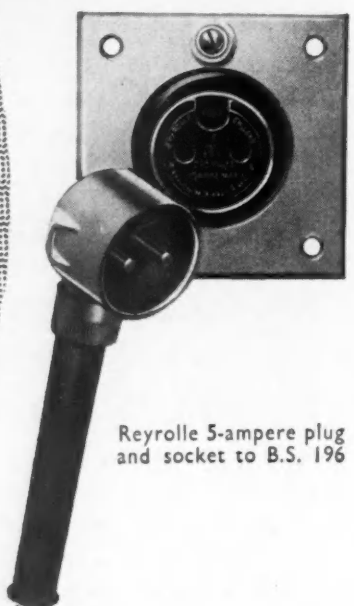
Trafford 2141 Telex 66413

Photograph by courtesy of Associated-Rediffusion Ltd.

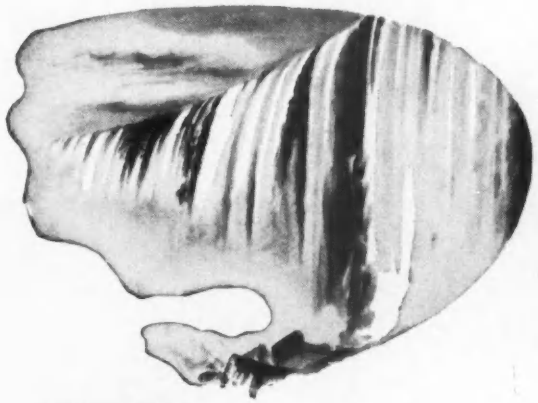
More than 2000 Reyrolle protected-type plugs and sockets are used in the No. 5 Studio of Associated-Rediffusion at Wembley Park to facilitate the flexible control of lighting and other fittings



Reyrolle 5-ampere plug and socket to B.S. 196

Reyrolle

A. REYROLLE & COMPANY LIMITED - HEBBURN - COUNTY DURHAM - ENGLAND



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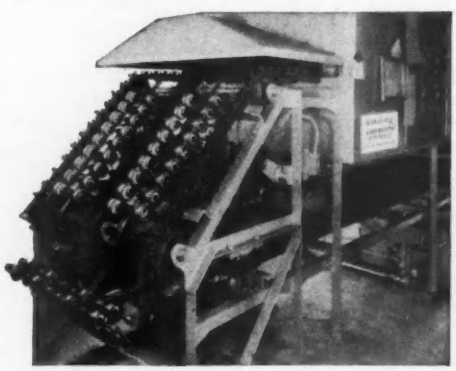

In this plant for Messrs Hoover Ltd., 275 vacuum cleaner armatures per hour are impregnated with insulating varnish by the revolutionary patented Zanderoll Process.

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and big peak viewing time spots on Sunday nights in October and November on all ITV Stations will make record Dimplex sales for you provided you have acted as follows:-

1. *Ordered stock*
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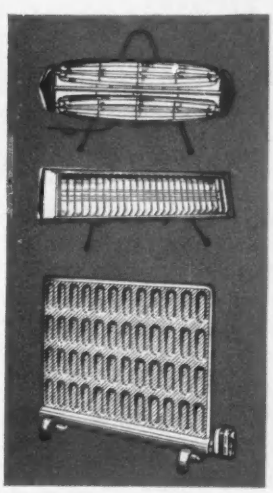
NOTE THESE NEW FEATURES



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New portable infra-red fire model IRF 225 (2¼ kW). £7 13s 9d tax paid.

Electric radiators – now with new thermostat, new mountings – which provide plug-in central heating at its wonderful best.

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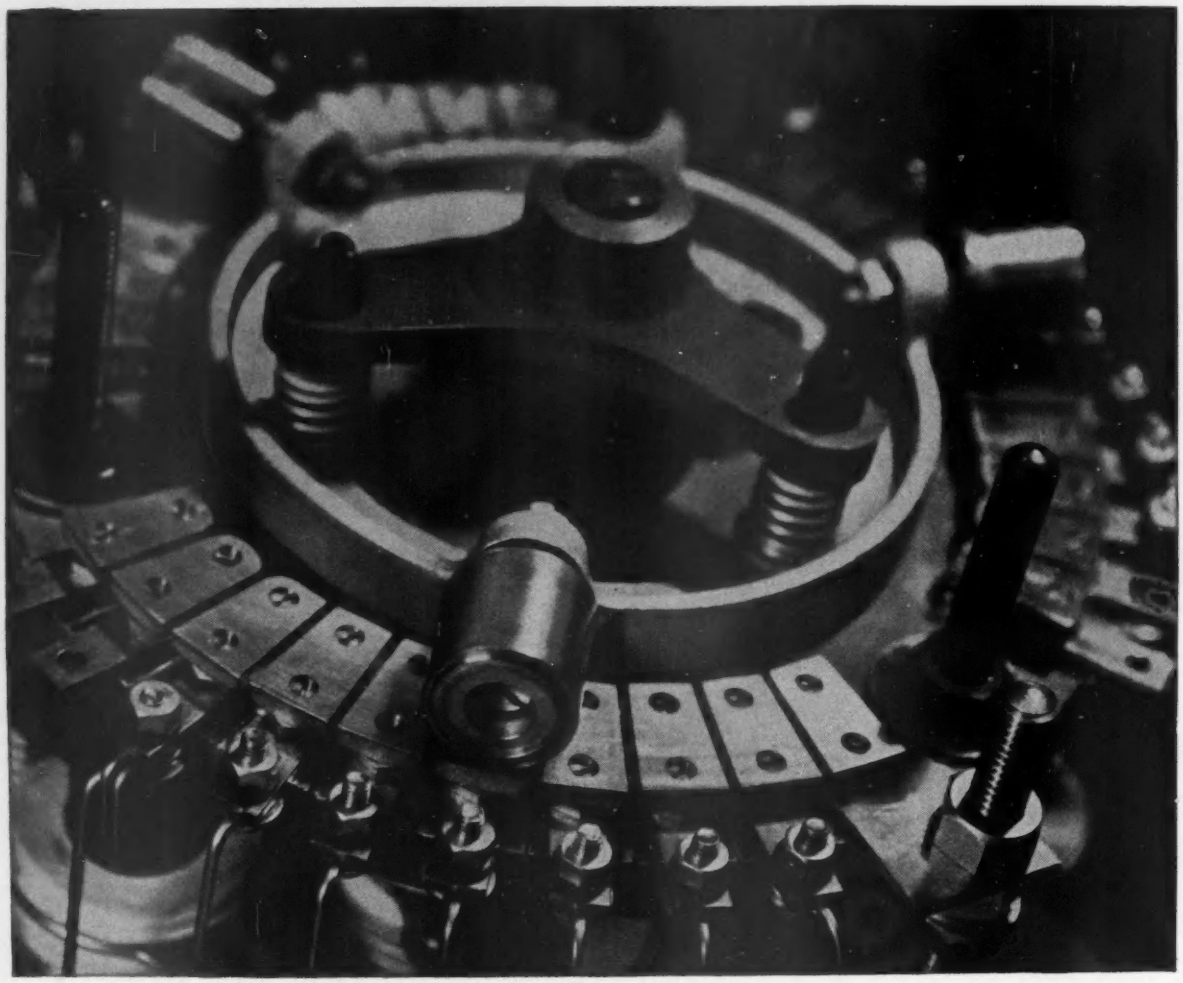
Take a new view of Ellison



Whichever way you look at it, these contacts for an Ellison rotor starter represent a minor masterpiece of engineering. They mirror that striving towards perfection so evident in every component that goes into the making of Ellison Switchgear.

Ellison Switchgear is manufactured to a standard rather than to a price, in the honest belief that this is the only way of manufacturing completely reliable switchgear. Ellisons have been long enough in the business to know what they're talking about.

Their formula? . . . . . Traditional skill, modern production methods and over half a century of specialised engineering knowledge. Add to this, bold and dynamic design that will still be ahead of its time in the next half century and you will understand why Ellison Switchgear is the finest in the World.

TRADE MARK

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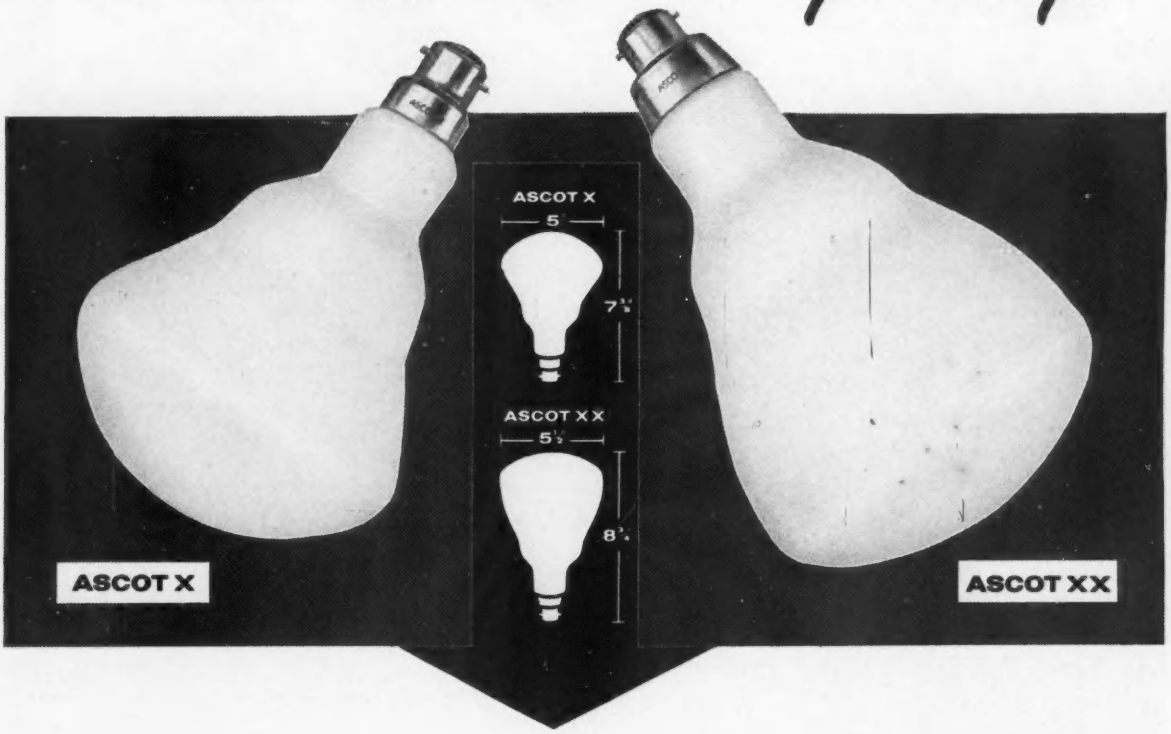

ASCOT X & ASCOT XX

EACH LAMP A COMPLETE LIGHT FITTING IN ITSELF!

Ascot X and Ascot XX lamps outdate all light-obscuring, dust collecting globes. These new shape lamps are complete fittings in themselves, designed to eliminate the cost of shades or globes and significantly reduce time and money spent on cleaning. As no dust can form inside them there is no loss of light — every Ascot X or Ascot XX lamp represents 2,000 hours of the best diffused, glare-free illumination. Each lamp is especially coated internally with titanium oxide made to Patent No. 737861 for extra brilliance and durability.

On high ceilings, or anywhere that's difficult to reach, Ascot X and Ascot XX lamps are the ideal fittings.

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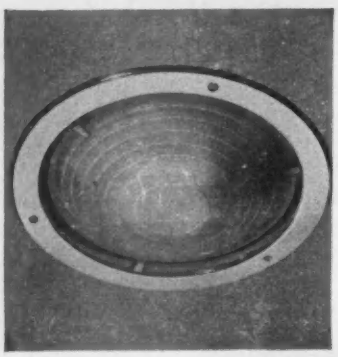

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For 100W IS lamp. Available in three colours, ivory-black, satin-silver, or satin-brass anodised.
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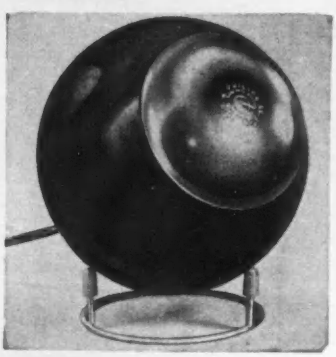

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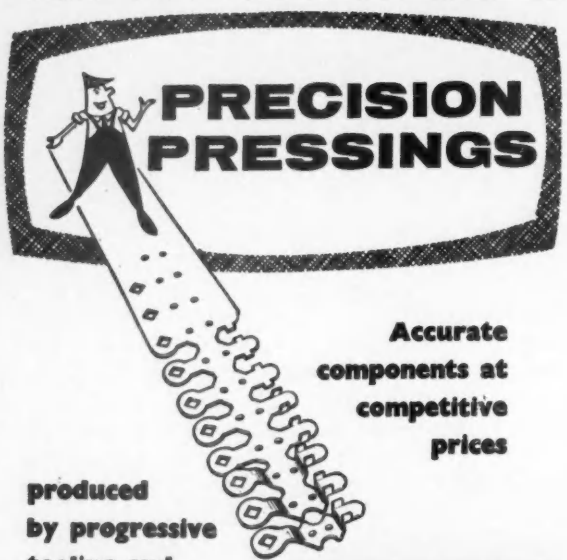

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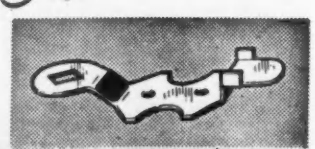
produced by progressive tooling and multiform methods.



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When you specify Class H insulated motors you are taking a big step in reducing your maintenance problems.

Class H insulation has ten times the life of Class B insulation when working under the same conditions, so the risk of insulation failure—a major cause of motor breakdowns—is virtually eliminated.

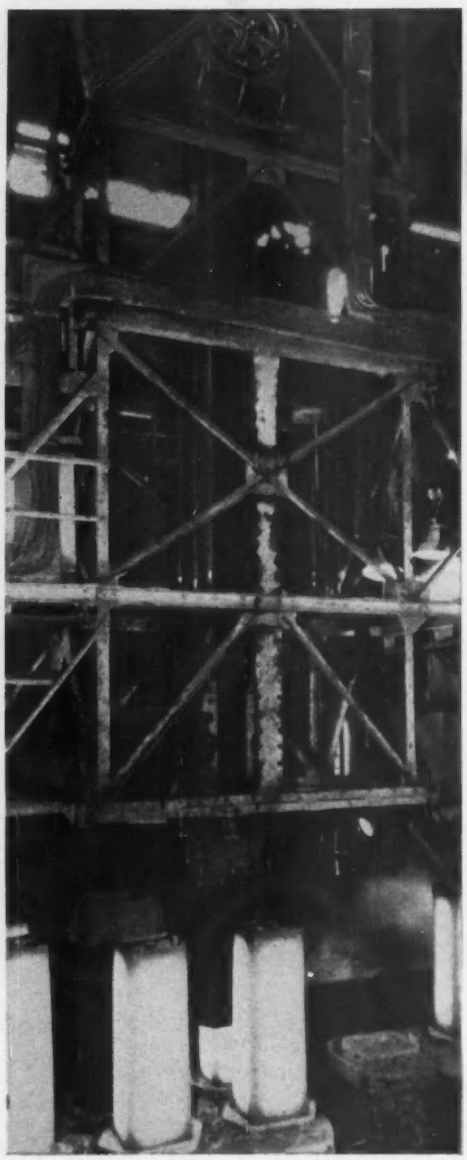
No matter how testing the working conditions, Class H motors will take the strain: you can safely subject your Class H motors to high humidity, scorching heat and heavy overloads. And it is often possible to choose a Class H motor of lower capacity than a Class A or B machine, because it is far more resistant to overload.

The advantages of Class H silicone insulation (to BS 2757) are by no means restricted to new machines. Many failing motors have been transformed into trouble-free units by a timely silicone Class H rewind.

Proved by tests: Continuous running tests have proved, that the insulation life of Class H motors outlasts both Class A and B insulation by *more than ten times.*

next time—try a Silicone Rewind

MS



CHOOSE THE MOTOR WITH H IN IT

£2,000 SAVED

with ONE Class H rewind

27 breakdowns in seven years. The cause? Insulation failure. The electric motor on a four-ton stripper crane at Workington Iron and Steel Company kept breaking down, so in 1953 the 50 hp Class A motor was replaced by a Class B insulated motor of the same rating specially designed for heavy duty—but there were still 5 insulation breakdowns over the next three years.

Because of production losses and the cost of rewinds the motor was finally rewound in 1956 with Class H insulating materials—silicones combined with glasscloth and mica.

Result? In the words of Workington Iron and Steel Company, 'No breakdowns since that date'. A saving of £2,000 in rewind costs with *no* further losses in production due to insulation failure.

These firms make Class H motors:-

Associated Electrical Industries Ltd · The English Electric Co. Ltd · The General Electric Co. Ltd · Bruce Peebles & Co. Ltd · Woods of Colchester Ltd · Brook Motors Ltd Lancashire Dynamo & Crypto Ltd · Brush Electrical Engineering Co. Ltd · Howells Electric Motors Ltd · Laurence, Scott and Electromotors Ltd.

Contact your nearest Midland Silicone area office,-and ask for a list of rewinders who carry out silicone rewinds. Also ask for a copy of our news bulletin: 'MS News for Industry'.

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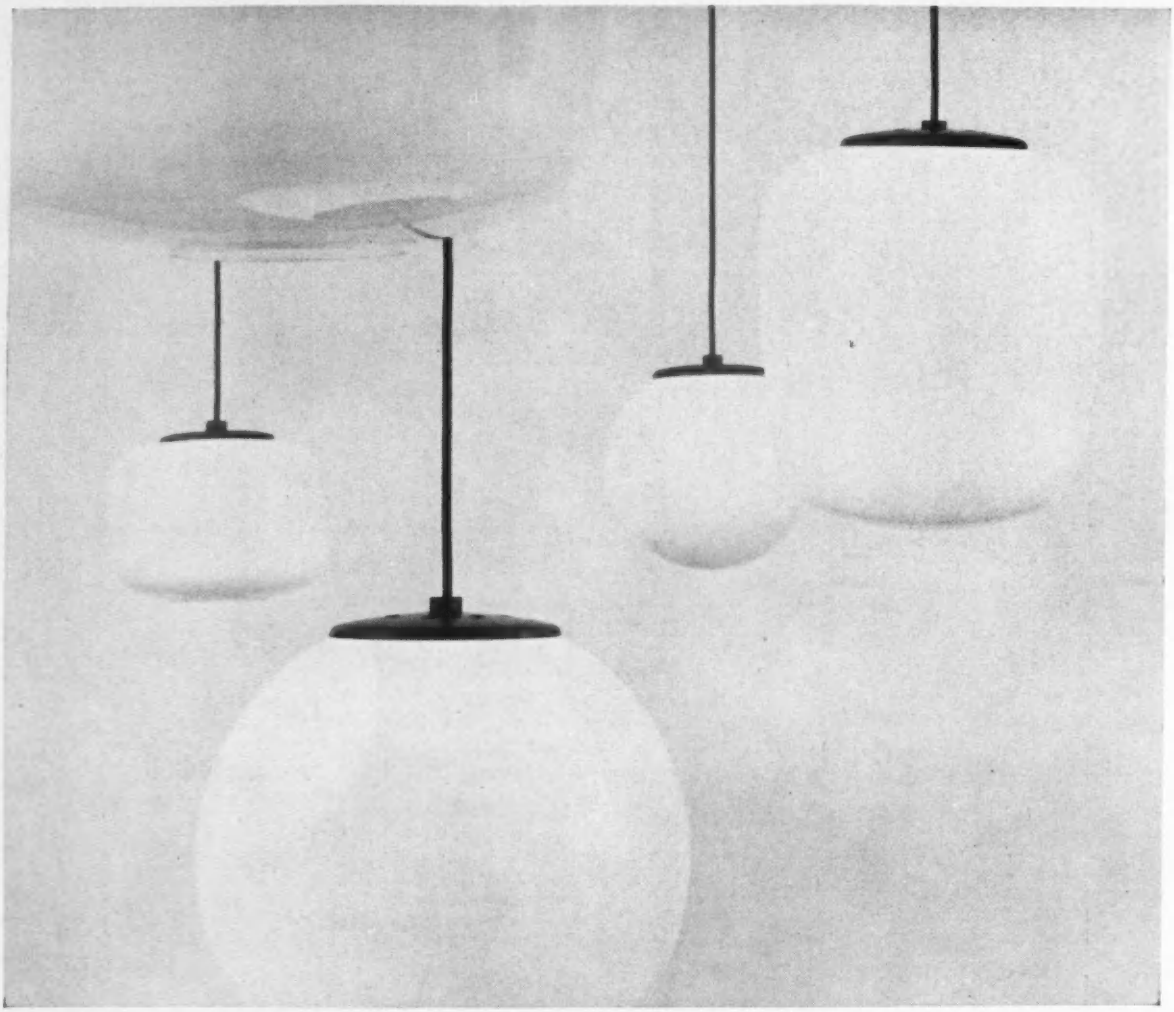
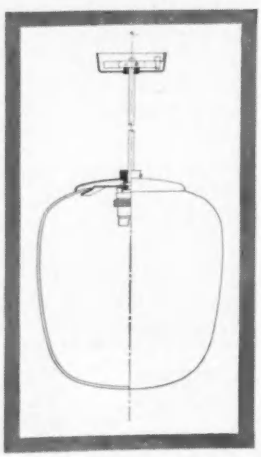
Area Sales Offices: Birmingham, Glasgow, Leeds, London, Manchester. *Agents in many countries.*



Atlas 'MAYFAIR' a new range of commercial glassware

Here is something refreshingly different for boardroom or typist pool, reception area or executive office . . . the Atlas 'Mayfair' range of commercial glassware. These elegant yet efficient fittings are available in three distinctive shapes and two sizes, providing enough variety to satisfy the requirements of large and small installations. Easily installed and maintained, the fittings have opal glass bowls which contrast with the black PVC suspension. Rod suspension is offered as an alternative. Although so practical and striking in looks, Atlas 'Mayfair' fittings are surprisingly competitively priced. Full details will gladly be sent on request.



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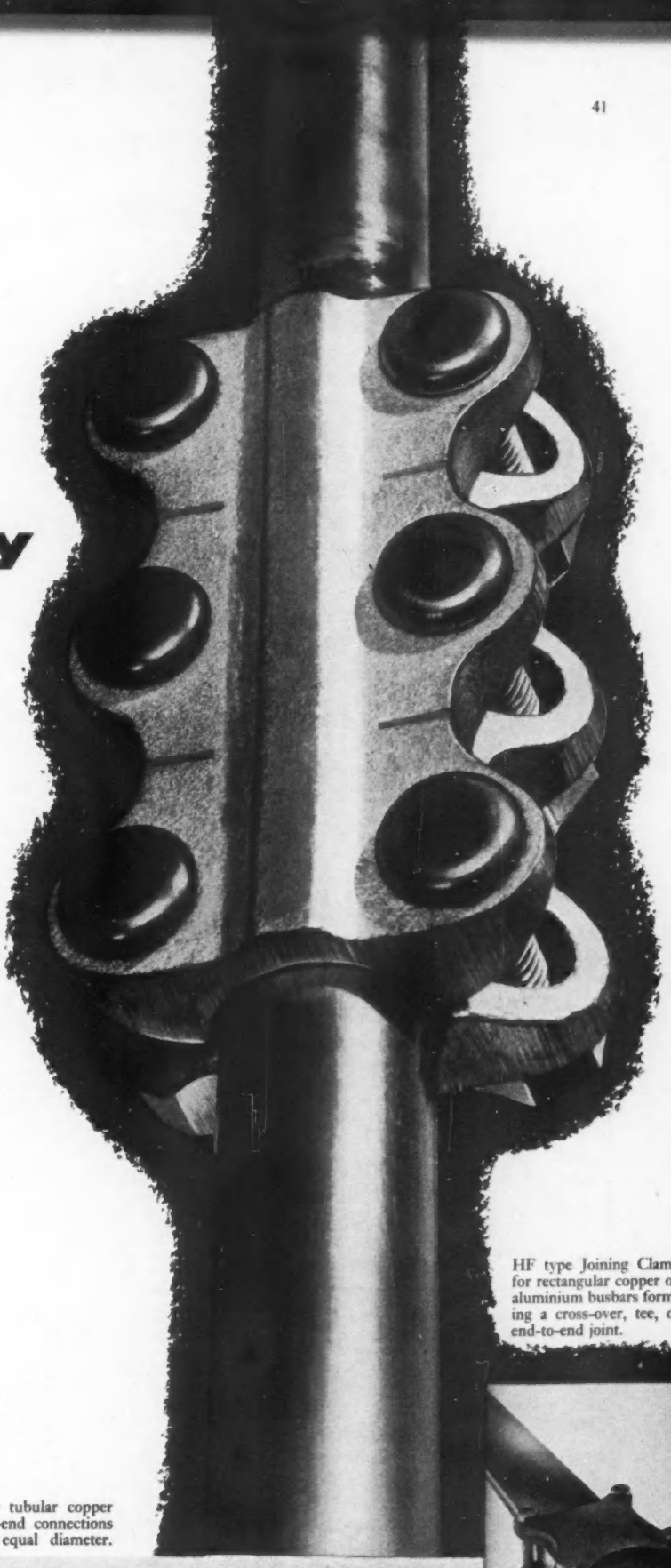
for every type of copper or aluminium installation

This comprehensive range of fittings includes all types of connectors, supports, clamps, and taps for tubular, rectangular, angle and channel busbars, stranded conductors and studs.

Manufactured by the most up-to-date production methods, the BICC-BURNDY range is backed by over 30 years experience in the design and development of busbar power connectors.

The new BICC-BURNDY Busbars and Power Connectors Catalogue gives full specifications of this range. Send for a copy today.



HF type Joining Clamp for rectangular copper or aluminium busbars forming a cross-over, tee, or end-to-end joint.

Coupler type NS for tubular copper busbar. Rigid end-to-end connections between busbars of equal diameter.

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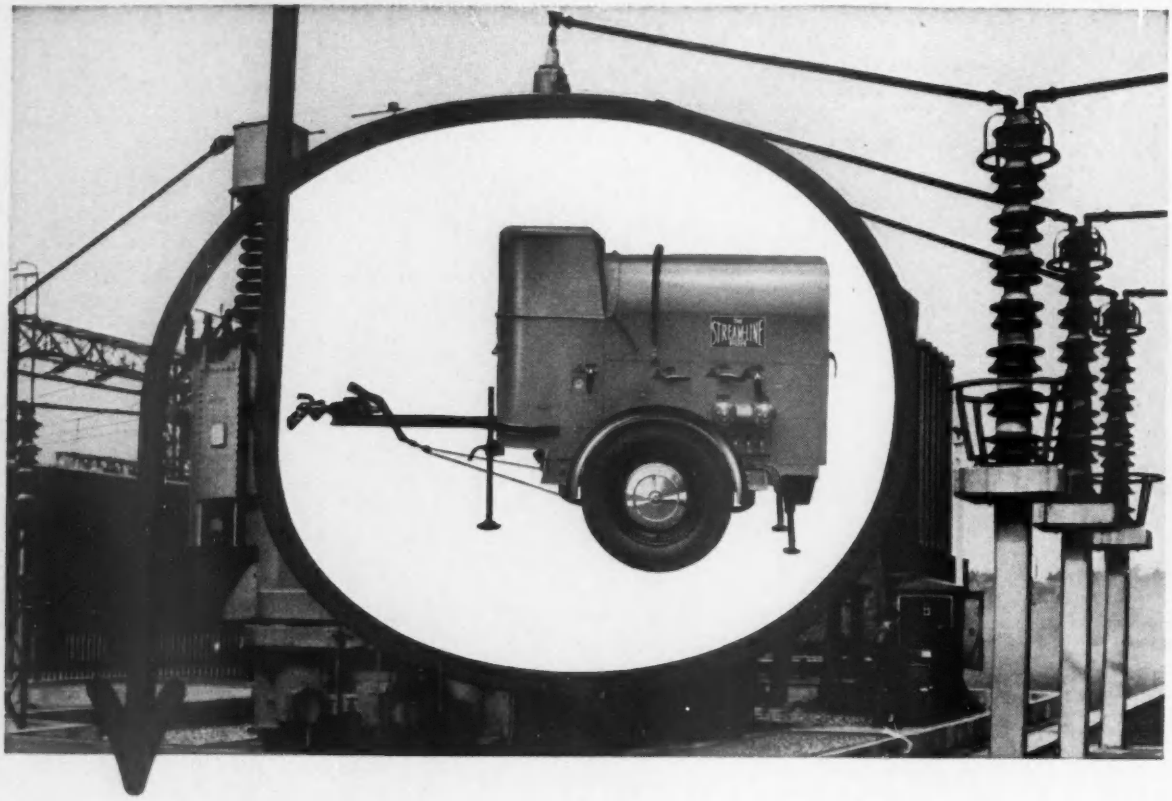
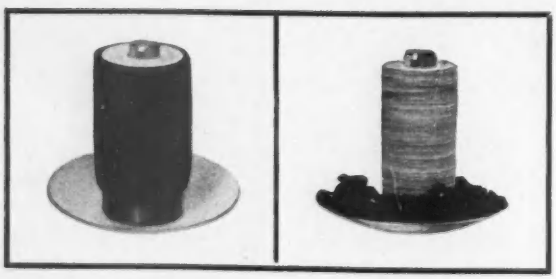


Loop in a Stream-Line filter



These illustrations show the Stream-Line filtering element built up of special paper discs under end pressure. Oil passes through the infinitesimal interstices between the discs leaving solid impurities at the paper edges. Instantaneous cleaning is carried out by a reverse flow of compressed air.

The security of oil-immersed circuit-breakers and transformers depends on the condition of the insulating oil, for if it contains impurities and moisture a serious loss of insulating protection will occur. The Stream-Line filter, embodying filtering elements, heating chamber and vacuum receiver, is the most perfect practical safeguard against this happening. A *single* passage of oil through a Stream-Line filter ensures the elimination of *all* solid impurities including the finest colloidal carbon. In addition, dehydration and de-aeration ensure the removal of all free and dissolved water and gases—*and the filtered oil will have a dielectric strength far above that specified for new oil.*

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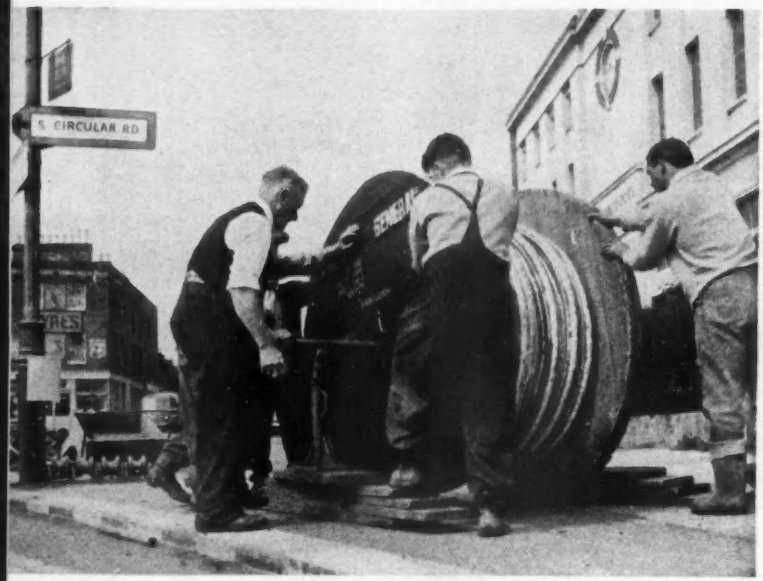

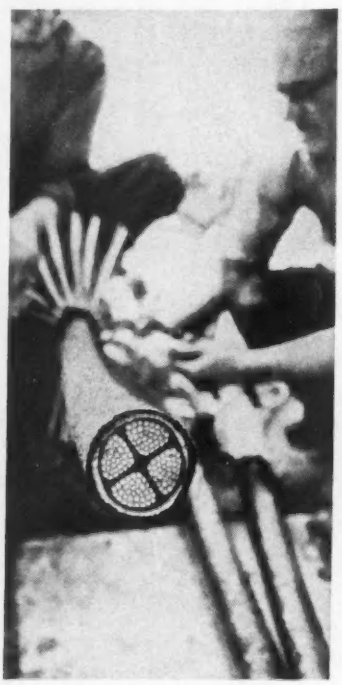

These cables will be as good as new in A.D. 2011

These gangers and jointers are laying cables made with aluminium conductors. It's a sight that is becoming increasingly familiar in British cities, from London to Glasgow. It means power PLUS for homes, factories, offices and mines. The PLUS is Alcan aluminium in those conductors. They will still be carrying their load 50 years from now.

The gangers are installing 4 core ·3 sq. in. low-voltage distribution cables. Aluminium is also increasingly used in high-voltage and extra-high-voltage feeders. It has great advantages for the sheathing of pressure-type cables. Jointing presents no problems.

Today, aluminium is the cheapest conductor material. Alcan production capacity and Alcan research make sure that it will hold its lead.

Cable manufacturers can give you further advice on aluminium cables. Write to them, or write to us:
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DURHAM RANGE

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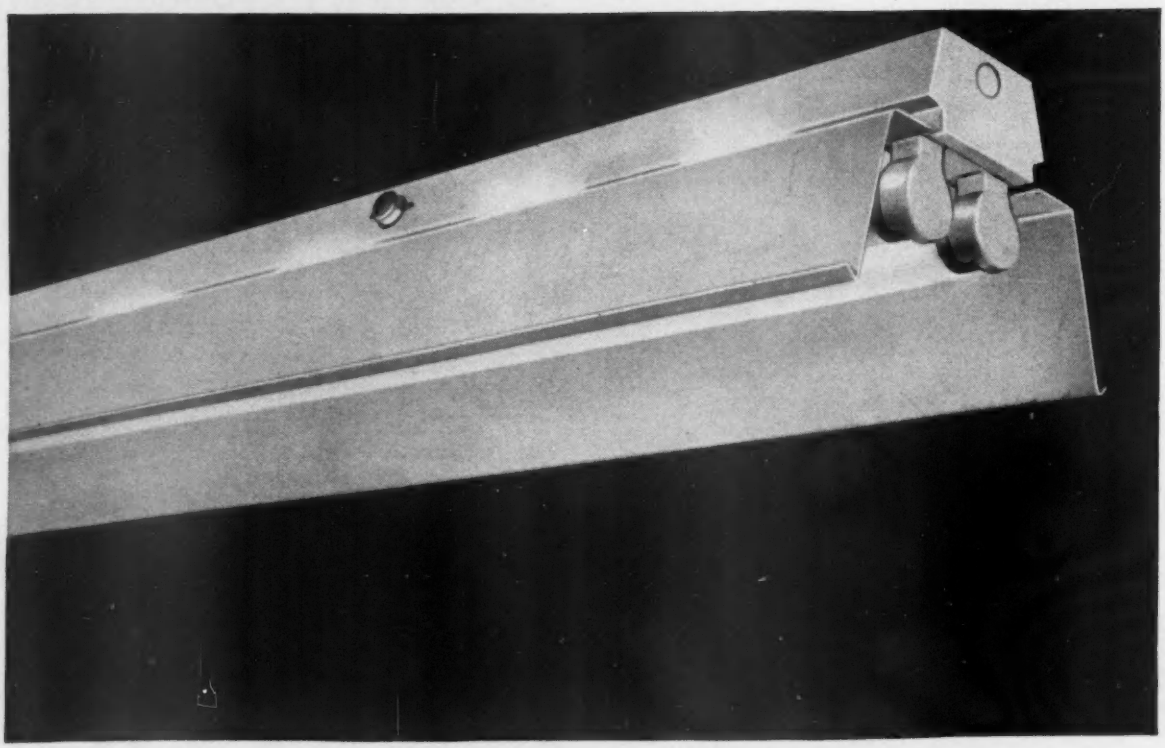

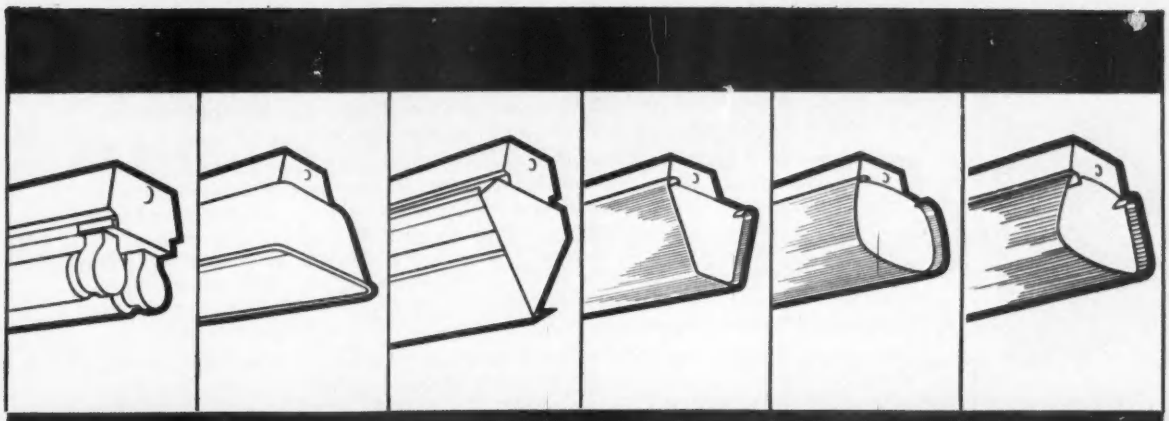

a complete and compact range

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- ✻ Easy installation and maintenance
- ✻ Superbly engineered

PRODUCED BY **EKCO**

- ✻ Competitive price
- ✻ Quality materials and manufacture
- ✻ Wide range of quick-fix reflectors and diffusers

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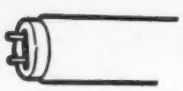
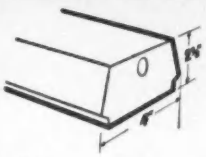
EASY ASSEMBLY AND MAINTENANCE

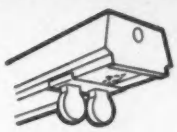


Tubes
For 8 ft., 5 ft. & 4 ft. single and twin.
Also 85w 8 ft. twin.

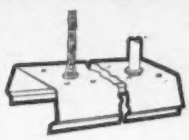


Spine
Identical strong shallow section for all tube sizes—single and twin.

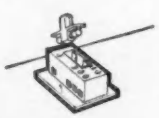
Packing
All fittings separately cartoned. Lampholder platforms ready-wired packed in spine.



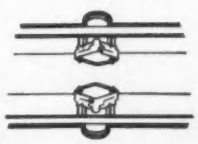
Lampholder Platform
Platform locked into position without tools. Lampholders cannot be reversed on twin fittings.



Installation
For chain, conduit or direct-on-ceiling. Knockout at centre and in endplates.

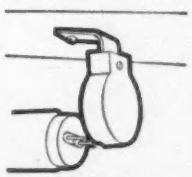


Fused Terminal Block
3-way block for fitting protection — easily replaceable B.S. cartridge fuse.

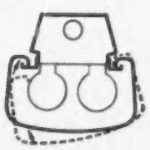


Starter Switches
Instantly accessible without dismantling fitting.

Reflectors & Cover Plates
Quickly and easily attached by a simple locking device.



Lampholders
White, plastic, sprung, bipin for positive operation.



Diffusers
Positively attached to spine by simple swing-over action.

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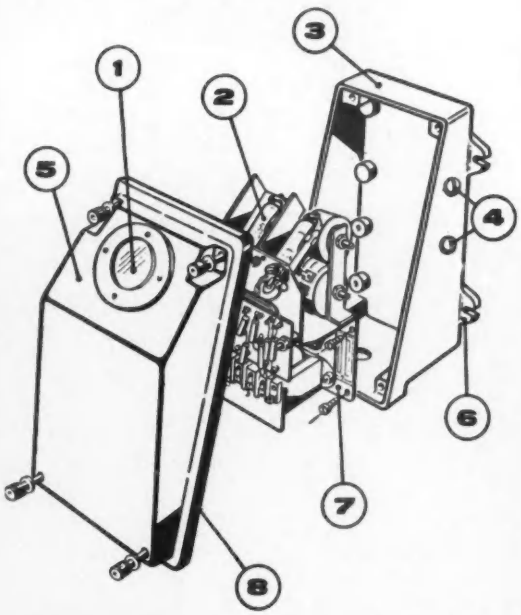

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3 Robust cast light alloy case
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6 Substantial mounting arrangements
7 Detachable internal chassis
8 Neoprene long-life seal

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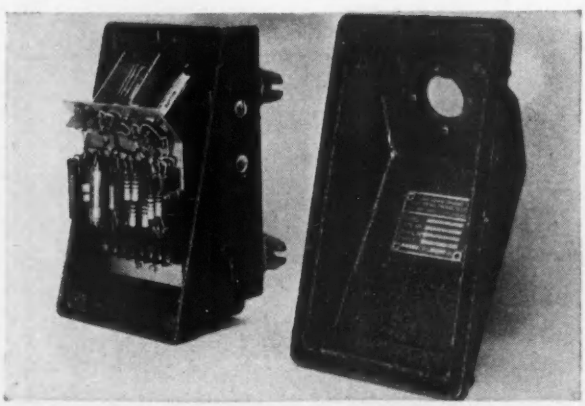
Standard wall mounting case with conduit entry from below — plug-in units are available as optional alternative.



Removable Neoprene sealed cover provides easy access to interior and users' connections.

The low cost and high engineering standards of the Automatic Lighting Control Unit Series ALC.3 opens new possibilities in many fields — controlling advertising signs; to make most use of dull days and avoid waste in the sun — controlling yard lighting; for more safety at dusk — controlling shop window lighting; maximum impact at minimum cost — in fact to provide more effective lighting and assured economy wherever artificial illumination is employed.

Ask our Standard Products Division for Publication E.1631-01 which gives more details of this money-saving unit.

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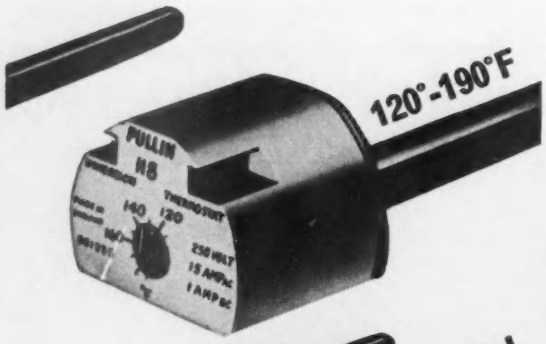
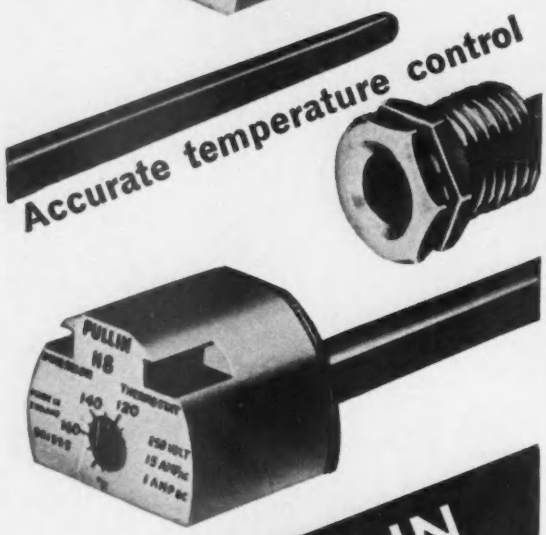


Accurate temperature control



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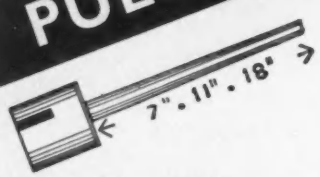

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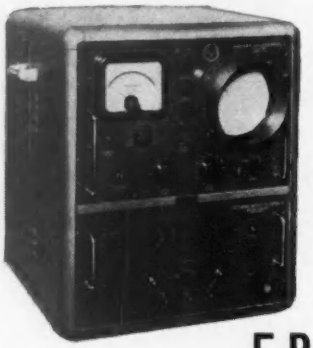

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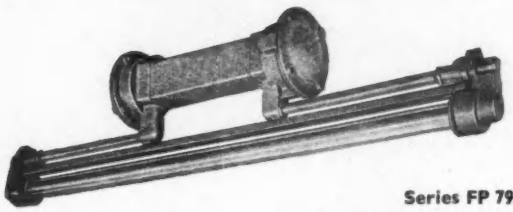

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Also made for 4 ft 40 watt and 2 ft 20 watt lamps.

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A range of weatherproof units Pendent and Bracket fittings to take up to 100 watt lamps, with Frosted or Coloured glasses.

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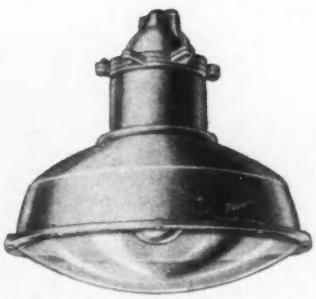

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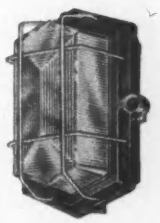
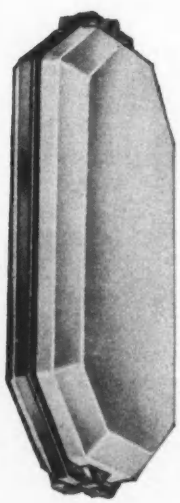


Series VS 7400

Prismatic Fittings for up to 150 watt lamps. With or without guards.

List Prices from 30/- each.

Catalogues on request



Series VS 8500

Fluorescent Bulkhead Fitting with Perspex cover to take 2 or 3 8 watt fluorescent lamps. Control gear is internally housed and the 3 light is arranged so that 1, 2 or 3 lamps can be switched on as required —designed to permit recessing or inside of corner fixing with ease.

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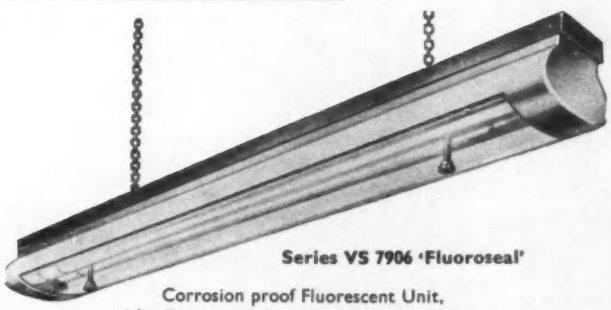

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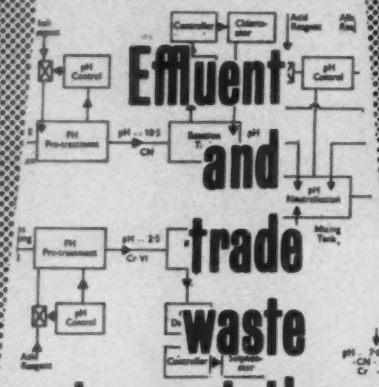

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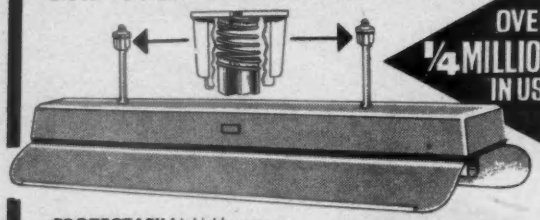

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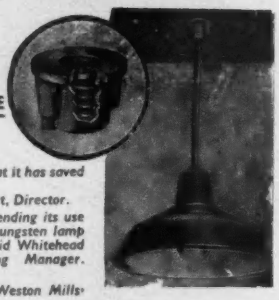

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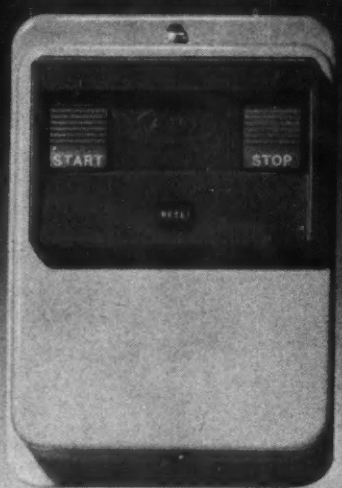

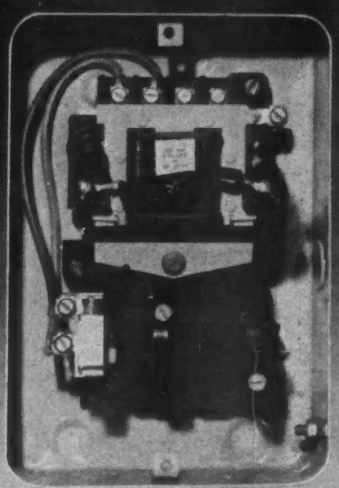

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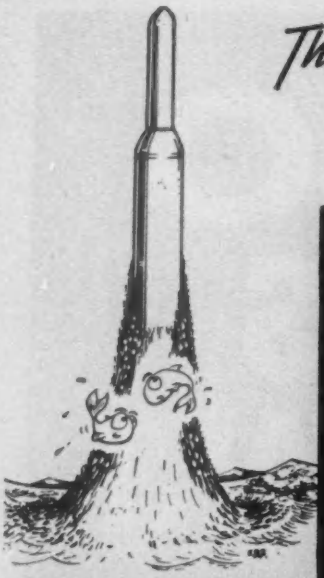

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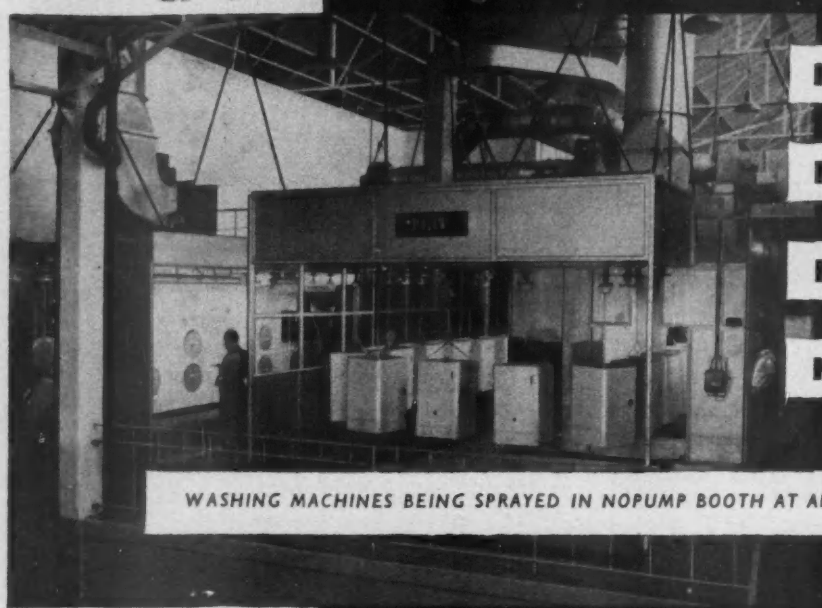
In this new type of Water-Wash Spray Booth the exhaust air travels at very high velocity over the water surface entraining water. The air/water mixture, moving through controlled changes of direction, provides the scrubbing action.



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THURSDAY 7 SEPTEMBER, 1961
Registered as a Newspaper Volume 140 No. 10

ELECTRICAL TIMES

SARDINIA HOUSE, SARDINIA STREET, LONDON, W.C.2
Telegrams: Equivolt . Estrand Telephone: HOLborn 6016

Dans ce numéro

Eclairage des bureaux 323

Le niveau d'éclairement recommandé pour les bureaux privés est de 323 lux. Pour arriver à ce chiffre sans qu'il y ait d'éblouissement dans les petits bureaux, il est nécessaire, contrairement à la pratique jusqu'ici, de se servir d'un plus grand nombre de lampes placées plus près l'une de l'autre. Par ailleurs, l'usage de lampes au tungstène sans abat-jour et fluorescentes est proscrit.

Souplesse dans les installations électriques 331

Un usage extensif de conduits montés sous le plafond principal permet d'obtenir une grande souplesse dans la distribution électrique d'un nouveau bâtiment à 34 étages. Des boîtes à montage plafond, prévues pour six câbles de sortie, répondent aux besoins de l'éclairage. Les cloisonnages en acier qui constituent les murs de bureaux peuvent loger les câbles allant vers les interrupteurs ainsi que les conduits se trouvant au niveau du plancher.

Eclairage dans les fermes 335

Les fermiers utilisent de plus en plus des bâtisses à double usage comportant une basse-cour sous abri. On y loge aussi bien le bétail que sa nourriture et ses litières. On peut améliorer à peu de frais l'éclairement en se servant davantage de projecteurs. Il est préférable de se servir de cloisons entièrement isolées, plutôt que de cloisons à revêtement métallique. Il est pratique aussi de suspendre, dans les grandes bâtisses, les lampes et les câbles sur des fils caténaires.

Lignes de 400 kV traversant la Tamise 340

Deux pylônes en acier d'une hauteur de 192 mètres porteront les lignes de transmission principale de 275/400 kV qui traverseront la Tamise à West Thurrock. L'écartement entre les pylônes est de 1380 mètres environ et la hauteur minimum des lignes au-dessus de la marée haute est presque de 77 mètres. Les six conducteurs sont en aluminium avec âme en acier, d'un diamètre de 5¾ cm, et se prêtent au fonctionnement sur 400 kV sans perte par effet corona.

In dieser Nummer

Bürobeleuchtung 323

Der für private Büros empfohlene Beleuchtungspegel beträgt 323 Lux. Um dies in kleinen Büroräumen ohne Blendung zu erreichen, ist eine grössere Anzahl von Beleuchtungskörpern in dichterer Packung, als bisher für nötig gehalten wurde, notwendig. Der Gebrauch von blanken Glühlampen oder Leuchtstoffröhren kommt nicht in Frage.

Anpassungsfähigkeit elektrischer Installationen ... 331

Der ausgedehnte Gebrauch von elktrischen Leitungen, welche unterhalb der Hauptdecke angebracht sind, ermöglicht eine gute Anpassungsfähigkeit für die Elektrizitätsverteilung in einem Gebäude mit 34 Stockwerken. Deckenverteilerdosen für sechs abgehende Leitungen versorgen die Beleuchtungskörpr. Die Stahlunterteilungswände der Büros sind mit Kabelführungen ausgerüstet für die Zuleitungen nach den Schaltern und nach den Verteilungsleitungen in Bodenhöhe.

Beleuchtung für Gehöfte 335

Landwirte benutzen in zunehmendem Masse Doppelzweckgebäude, welche einen überdachten Hof einschliessen. In ihnen sind sowohl die Tiere als auch ihr Futter und die Streu untergebracht. Die Beleuchtung kann bei Einhaltung vernünftiger Kosten durch die vermehrte Verwendung von Richtstrahllampen verbessert werden. Vollisolierte Wandlampen sind Lampen in Metallgehäusen vorzuziehen. In hohen Gebäuden sind an Tragedrähten aufgehängte Lampen und Kabel besonders nützlich.

400 kV Leitung über die Themse 340

Zwei 192 m hohe Stahltürme werden bei West Thurrock die 275/400 kV Hauptübertragungsleitung über die Themse tragen. Die Spannweite beträgt nahezu 1380 m und die Höhe über dem Flutpegel nahezu 77 mm. Die sechs Leiter bestehen aus Aluminium mit einem Stahlkern, der Durchmesser beträgt 5,75 cm und ist für den Betrieb mit 400 kV ohne Koronaverluste geeignet.

Relighting 100,000 Offices 323
by W. J. Jones, M.SC., M.I.E.E.

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The 'MEMREX-EXEL' Range of Switchgear

Complies with B.S. 2510 - 1954

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SWITCHFUSES:
10-15-30-60 AMPS
500 VOLTS

This new range of "Memrex-Exel" switchgear provides one of the most up-to-date and technically advanced ranges of 500 volt industrial switchgear yet offered to the industry. Modern styling, sound technical performance and compliance with all relevant British Standards Specifications are basic essentials.

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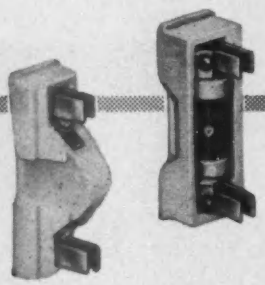

H.R.C. cartridge patterns are interchangeable with semi-enclosed rewirable pattern and comply with B.S.88: 1952.

M.E.M. H.R.C. cartridge fuse carriers are designed to accommodate H.R.C. cartridge fuse-links made to B.S.88: 1952, Appendix 'J' Dimensions, Form A-Offset Tags.

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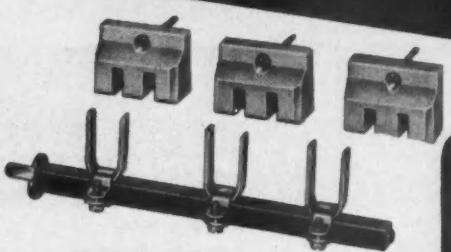

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ELECTRICAL TIMES

ESTABLISHED 1891

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LIGHTING PROSPECT

The collection of articles on current lighting topics which is a feature of this issue of the ELECTRICAL TIMES, mirrors attention that is being given to office lighting at present. In part this is a result of legislation, both recently enacted and in prospect. Once minimum realistic standards of lighting are demanded for the office worker, and some sort of enforcement system established, it becomes more practical to press for lighting provision that will maximise working efficiency. That is the background to the drive for better lighting of the 20 ft by 20 ft office which will be spearheaded by the British Lighting Council's campaign this autumn. Small office lighting is the province of the electrical contractor, who may find a need to brush up his knowledge on lighting as he has had to do in the past with other branches of technology. By doing so, he can hope to reap more business (if he can accept it in the present state of the building industry) through exploiting his traditional role as the electrical industry's front line consultant. But the lighting opportunity goes further than the small contractor. With improvement in quality of light sources combined with greater efficiency in terms of energy cost per unit of light output, there are exciting lighting possibilities in the larger offices, where design is the sphere of the specialist illuminating engineer. Radically new thinking is entering into the questions, when to switch off the lights, and what provision to make for daylighting. Here again, there is opportunity for the electrical industry to exploit the essential flexibility and controllability of electricity. In both large and small offices, the user can be offered a good return in terms of productivity for his capital outlay. The need is for the industry to push the idea.

TRADING CRYSTAL GAZING

The British Association at its annual meeting interprets broadly the content of "science." Besides abstruse offerings extending from astronomy to zoology in what most people would regard as the sciences, the pattern of trading and of social organisation received attention from speakers. Not for the first time, GEC's economic and marketing adviser, Mr M. Stacey, attracted particular attention with an attempt to sketch the pattern of trading some years ahead. He predicted something of a stalemate between larger manufacturers controlling a number of retail outlets, and larger retailing organisations bargaining powerfully with all manufacturers. What seemed rather lost in all this was consumer service. That was sacrificed to offering the consumer a low price for the bare product. To offset this change, Mr Stacey foresees an extension of the service contract idea, with after-sales

service being handled on a contract basis by specialised firms, perhaps covering the whole range of large domestic appliances to be found in the home, not the electrical equipment alone. The idea is attractive in many ways, although it may not work so well for major appliances as it has for TV. Faults in major domestic appliances are less frequent than in relatively complicated electronic equipment, and they are more amenable to the attentions of the amateur handyman. A pre-committed annual outlay as an insurance seems unlikely to be popular in such circumstances, especially when nothing drastic goes wrong for some years. But if price competition at all levels of trading does rule out proper after-sales service provisions by manufacturers or retailers, there may be sufficient scope for developments of this kind. It is not work that independent electrical contractors and retailers are likely to welcome to the fullest extent, if the trading pattern predicted by Mr Stacey is in fact realised.

EXHIBITION REBUFF

That the electrical industry does not want an exhibition devoted to electrical domestic equipment and open to the public now seems firmly established. A widespread inquiry for support for an exhibition of this nature to be held in London next year has been met with apathy, if the proportion of those circularised who have taken the trouble to reply is accepted as a guide. Such opinion as was expressed was against the holding of the proposed Electrical Fair. Thus, for the second time, a proposed date has had to be abandoned. The rebuff is probably decisive. It infers that the industry does not see sufficient value in another specialist exhibition, or doubts its pulling power so far as the public is concerned. There remains for would-be exhibitors a strong domestic equipment representation at the Electrical Engineers' Exhibition, the Ideal Home Exhibition as a venue for showing domestic electrical equipment to the homes-conscious public, and the EDA Exhibition as an effective way of reaching the electricity boards' sales outlets. None of these exhibitions can do as much by way of exports promotion as a specialised exhibition with full industry support might have done, but that consideration has evidently been generally considered insufficient to outweigh arguments against supporting the Electrical Fair. Anything less than full support would have greatly weakened its attractiveness for overseas buyers. Quite separate as a problem is what resources manufacturers should devote to showing their products in the established overseas fairs. Growth in this practice cuts down the effort thought practicable in support of exhibitions within the UK.

COAL'S BEST CUSTOMER—AND OIL'S

Release last week of official figures for fuel and power in Britain in 1960 draws attention again to the predominating place occupied by the supply industry in both coal and oil purchasing, and the way that position has been enhanced in recent years. Eleven years ago, in 1950, electricity took just over 17% of the coal industry's output. For 1960, the present return shows that the share has climbed to 26% of the almost identical total sales. Over 17 million more tons are coming to electricity supply, and the amount of lowest grade coal (untreated slacks and smalls) is up by 20 million tons. There is the answer to coal industry critics who attempt to imply that by using oil, and investigating the possibilities of nuclear power, the electricity supply industry is seriously damaging the coal industry. None the less, the 1960 statistics are impressive on the subject of the growth in use of oil by the supply industry. In 1955, public electricity supply was using under 4% of the 4½ million tons of fuel oil sold for burning. By 1960, total sales had increased to 15¾ million tons, and the electricity industry's share of that increased total had gone up to over 34%, despite the enforced cut back in the amount of conversion to oil burning. There can be no gainsaying the high importance of electricity supply as a fuel consumer, an importance much increased by its growth potential.

FIRST AID FOR SHOCK

Artificial respiration promptly applied and resolutely persevered with is the most important available treatment for electric shock. For many years now, the ELECTRICAL TIMES has published wall charts giving simple instructions for this treatment, charts which meet the requirements of the Electricity Regulations under the Factories Acts for display of "instructions as to the treatment of persons suffering from electric shock." But fashions in shock treatment change, as medical research advances. In recent years, there has been a strong move in America and elsewhere to the technique of the rescuer breathing directly into the mouth of the unconscious victim, the so-called "mouth-to-mouth" or "Abraham breathing" method. This is reflected in the inclusion, in the latest edition of our shock card, of instructions for using mouth-to-mouth resuscitation, as well as improved diagrams of the Holger Nielsen method, which not many years past was proclaimed as an improvement on the long-established Schaefer technique. It seems thoroughly established that the mouth-to-mouth method is more effective as a means of forcing air into and out of the victim's lungs, and it avoids some dangers of making other injuries worse, when shock has been accompanied by a fall or burning, as so often it is in the electrical industry. The big objection to the mouth-to-mouth method arises from aesthetic considerations. The question to be decided is how far these will be thrown aside in an emergency, as they should be. Ancillary devices to eliminate direct contact between victim and rescuer are marketed, but their availability could not be relied on. Mouth-to-mouth is simple to apply as well as efficient; that earns it its place in our publication.

Meteor

This week's quick summary of electrical news faces advertisement page 16

RELIGHTING 100,000 OFFICES

Opportunity for Electrical Contractors

by W. J. Jones, M.Sc., M.I.E.E.*

THE electrical industry is getting into gear this autumn to make an outright attempt to improve office lighting in this country. It will have a tonic effect in offices in general and at the same time anticipate government legislation, which will do for office workers what the Factories Acts do for industry.

Although there has been something in the nature of a boom in office building of recent years, the fact remains that the majority of offices are under-lighted and the numbers run into hundreds of thousands; most consist of small one-room or two-room offices which are dark, dingy, ill-ventilated, badly lighted and generally little changed from conditions obtaining 50 years ago.

Such offices are occupied by the professions or attached to small factories or small commercial undertakings including shops.

Think of some of the professions and occupations involved and how good lighting could change working conditions.

Accountants whose premises should exude efficiency.

Lawyers' chambers could be relieved of mustiness and gloom.

Stockbrokers' offices given a lively and expectant atmosphere.

Banks, added prestige.

Government and local government offices, relief from boredom and inspiration for initiative.

Railway offices, a spur to serve the public.

Hospitals, an air of cleanliness and efficiency, and the many administrative activities flowing from factory and commercial management.

Small Offices

Consulting engineers, the manufacturers of lighting equipment, and contractors specialising in lighting are well able to interpret and specify the lighting needs of large offices and it is fully expected that lighting levels will go up and up over the years and that provision will be made by those responsible to enable the occupiers to keep up with the times.

The main task of the industry is to make a concerted and mass attack on small offices, those up to 20 ft by 20 ft in size, and in ultimate, the supply and contracting sections of the electrical industry are best placed to make effective contact with the prospects.

Broadly speaking the lighting requirements are the same for all offices, large or small. They are:

(a) In all work areas, lighting of such intensity as to facilitate work and of such a nature as to be comfortable and free from objectionable shadows.

(b) Lighting that creates in work areas a pleasant and agreeable atmosphere.

(c) In other parts—corridors and service rooms such as to promote safety and cleanliness.

Fig. 1. A good example of office lighting—ample light on the desk and the typewriter. Note also the adequacy of light at the card index and on the wall chart

Lighting Intensities

The gift of eyesight is such that it adapts itself to prevailing lighting conditions and makes the best of them, but it must not be forgotten that good lighting makes seeing easier, and that poor lighting makes the work harder for the eye.

Visual tasks in offices are many and exacting and when considering the lighting arrangements the following facts need to be borne in mind.

1. Light is a magnifier of fine detail. (An optician will tell if additional aid from glasses is necessary.)

2. In one hour of reading, the eye stops and goes 9,000 times and the point of fixation travels carefully and critically along each line of print for a distance of 4,500 ft.

3. As they get older, the eyes of most people undergo a double change.

(a) a reduction in capacity for bringing objects into focus;

(b) a reduction in pupil size.

The former requires attention at the hands of an optician while the latter is one of the reasons why people require more light as they get older.

It is also a fact that given freedom of choice, the average office worker prefers lighting levels as found in good daylight, appreciating that the visual task, especially for fine work, is made easier. He also likes the tonic atmosphere of such lighting levels—so different from the

* Mr Jones recently retired from directorship of the Electric Lamp Industry Council and the British Lighting Council.

Fig. 2. Close-up of lighting at the typewriter in Fig. 1. Note the effective use of venetian blinds to provide a good reflecting surface at the window

somnulent condition usually prevailing. He likes the visual task to be brightly lighted and to have bright and cheerful surroundings.

The IES Code recommends a lighting level of 30 lm/sq ft, well below good daylight but several times greater than that in common use. Table I lists lighting recommendations for the various locations in offices.

Table I. Lighting Recommendations for Offices
(Based on the IES Code 1961)

Location	Recommended Illumination lm/sq ft
Entrance halls, reception areas, inquiry and waiting rooms	15
Private Offices	30
General Offices: book-keeping, typing and general clerical	30
Business machine operation	45
Cloakroom and Toilets	10†
Stairs	10
Lift lobbies	15

†Additional lighting required over kitchen equipment and at mirrors

Supplementary Daylight

Even where good daylight is available, electric lighting is necessary in at least part of the office for half the total working hours per annum if the recommended level of 30 lm/sq ft is maintained. If electric lighting is not provided, then either people work in the office under an unnecessary handicap of insufficient light; or part of the office space is unoccupied, and rent is being wasted.

Supplementing of daylight for this purpose involves installing lighting fittings in areas remote from windows, and so arranging the wiring that these fittings can be switched on during daylight. It is also necessary to have lighting fittings placed near the windows themselves (preferably one at each window) to provide light when daylight fades. Additional lighting fittings are desirable in the central area for any room more than 12 ft deep.

In connection with the placing of lighting fittings, it is worth keeping in mind that provision of light-coloured venetian blinds permits control of sky dazzle by day to the benefit of all workers, and at night provides a reasonably good reflecting surface in place of the black void offered by ordinary windows.

Glare Index 19

Glare in its acutest form causes serious disability to seeing. It arises when a light source in the near distance is in line or nearly in line with the visual task. Such a condition does not often apply directly in offices, but it can be caused by reflection of brightly lighted objects within the field of view, (such as the bright parts in old designs of typewriters, or the sheen of glossy paper). This indirect glare can usually be avoided by slight adjustment of the position of the worker in relation to the visual task and the effects can be reduced by use of lighting equipment of low brightness and large area.

Much more common, however, and a frequent cause of trouble is the discomfort "glare" arising from light reaching the eye from distant fittings, particularly those subtending a small angle to the horizontal. The effect of such glare from successive fittings within the line of view is cumulative and it is obvious that since the longer the office the more fittings there will normally be within the field of view, there is more difficulty in planning a glare-free lighting installation for larger offices.

Fig. 3(a) illustrates the situation which arises assuming the use of fittings giving a general distribution and consequently a substantial amount of light horizontally.

It is desirable to use fittings where little of the downward light emerges in a near horizontal direction, see Fig. 3(b).

The IES Code prescribes that for

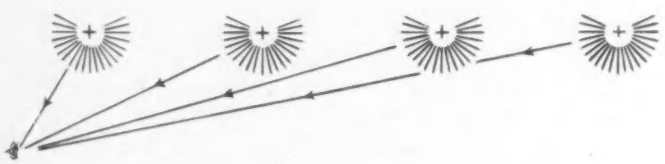

Fig. 3(a) (above). With fittings which give approximately equal light output in all downward directions, considerable glare may be received from distant fittings which are at only a small angle above the horizontal line of sight. It may, therefore, be inadvisable to use such fittings in a long room

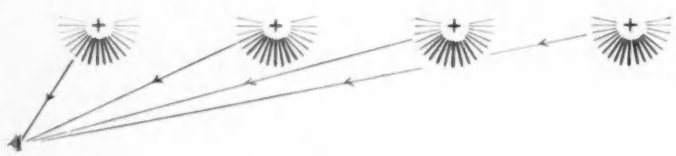

Fig. 3(b) (right). If the fittings give a restricted amount of light in near-horizontal directions, the distant fittings have a much-reduced glare effect and are more suitable for use in an extensive installation

normal office work the glare index should not exceed 19. This in practice is a pretty stiff requirement. For practical purposes, it excludes the use of exposed lamps, whether tungsten or fluorescent, in almost all office installations. This glare index of 19 is based upon a definite limit being placed on the amount of light flux emitted in the near horizontal direction.

One practical result of this IES recommendation will be the increased use of lighting fittings giving a more concentrated light distribution and will mean the use of a larger number of fittings closer together than has hitherto been considered necessary. In the case of larger installations the introduction of screens and elements, sometimes of a more architectural character, will be required to break up the otherwise unimpeded distant view of bright fittings or a brightly lighted ceiling.

30 lm/sq ft in Service

It is well known that a new installation of lighting fittings and lamps is subject in the course of time to depreciation, due to the falling off in light output of the lamp throughout its life and to the absorption of light from the accumulation of dirt and dust on the fitting itself.

Assuming a reasonably clean location and a cleaning schedule every month or so, the light provided initially should allow for a depreciation between cleaning periods of some 25%.

With this in mind, Table 2 gives an approximate basis for the installation of lighting in a series of small offices, assuming a mounting height of 10 ft.

Lighting Fittings for Small Offices

Almost any of the modern commercial lighting fittings marketed by reputable manufacturers can be installed without technical difficulty in small offices of up to say 20 ft by 20 ft. For larger offices the choice is more limited, and in any event it would be wise to take expert advice when designing larger installations. Old fashioned pendants should be replaced by modern fittings in which the light source (filament or fluorescent) is screened from view at normal viewing angles. This is necessary in order to meet the IES limitation of the glare factor to 19. The single lamp pendant or batten fluorescent lamp fitting has little or no place in the office.

It has to be remembered that any attempt to light other than a mere box of an office with a single lighting fitting is bound to prove unsatisfactory. Taking electricity consumed into account, fluorescent lighting with efficiencies in light production several times greater than that of filament lamps will normally prove less costly overall. In addition, on account of lower surface brightness and large area, a fluorescent lamp installation is more likely to meet the IES Code in respect to freedom from glare and harsh shadows.

Table 2. Number of Fittings and Alternative Layouts

Room Size	"Highest efficiency" fluorescent	Tungsten lighting in appropriate fittings
12 ft by 12 ft	Four 80 watt lamps in fittings intelligently spaced in respect to probable positions of desks, etc., and especially in relation to window positions	Four 300 watt lamps
12 ft by 20 ft	Six 80 watt lamps in two lines of three fittings	Six 300 watt lamps in two lines of three fittings
20 ft by 20 ft	Nine 80 watt lamps in three lines of three fittings	Nine 300 watt lamps in three lines of three fittings

Fig. 4. A private office with conference annex. The lighting fitting near the desk is a good example of "spreading the light"

Fig. 4 is typical of many private offices—a working area at a desk and a conference table in a corner or annex—essentially a room for prestige lighting. Lighting taking its part with furnishings there is great scope for dramatic and stimulating settings. A multilamp fitting—modern or traditional—will add greatly to the appearance of an executive's office. A point worth watching is the contribution that wall brackets can make in giving the room a sense of scale.

Decorations

The nature of wall decorations and the reflectivity of office furniture have importance on the utilisation of light in a small office. Dark walls absorbing a lot of light makes the provision of adequate lighting more costly. However, it should be kept in mind that wall surfaces form a background to the visual task and if they are too bright will induce discomfort. The IES Code suggests that the brightness ratio of a visual task to the immediate background (usually the top of the desk) should not exceed 3:1, while that of the visual task and walls and partition etc., should not exceed 10:1.

There is much to be said for providing desks with light coloured tops, and of limiting wall splash of light from fittings near light coloured walls or of redecorating the wall concerned with a hue of lower reflectivity.

Corridors and Staircases

Corridors and staircases are a frequent cause of accidents and must be adequately lighted, but it is impossible to give a general prescription as circumstances vary so much. Once again, note that single light sources (filament) of less than 100 watts are unlikely to be effective and where practicable spread the light by using multilamp fittings. It is particularly important to light the treads of stairs and to avoid glare from unscreened lights.

LIGHTS ON ALL DAY

The Need for Permanent Supplementary Lighting in Buildings

by J. Boud,* B.A.

OUT-OF-DOORS, in daytime, we depend on natural light; equally obviously, indoors at night we use electric light. But what of the interior during the day? A few years ago this might have seemed a ridiculous question. For most of man's existence, artificial light sources have been so puny that their use in the hours of daylight was considered only in places where natural illumination could not penetrate.

The first change in this attitude was brought about by the demands of atmosphere: "A building with windows is not a theatre," they said, and rightly so, for if what an audience sees is to be completely under control, the lighting must be, too. Recently, the same approach has spread to retailing: "Daylight is not a selling light." In a big store the periphery of each floor is given over to offices, fitting rooms and store rooms, so that the sales area is isolated from daylight, and what the customer sees is completely controlled.

With the continuing increases in lamp efficiency, however, it was only a matter of time before the fact that electric light was getting cheaper prompted the very significant question: are there circumstances in which using artificial light can be more economic than depending on daylight? To many people this still seemed ridiculous. "After all, however cheap electric light becomes, daylight is free!" This is the fallacy that the last decade has demolished.

Economics of Daylight

On the purely economic level the case was first fully argued in terms of the single-storey factory. In this relatively simple type of building it is possible to make a reasonably accurate assessment of the comparative costs of the two alternatives: (a) a relatively complicated structure involving glazing to admit daylight with all this implies in terms of heat loss and extensive maintenance; or (b) a simpler, insulated, but opaque roof and the permanent use of electric lighting.

In such a calculation it is necessary, of course, to consider initial or installation costs as well as running costs, and to make assumptions about the life of the building and of the lighting system. This kind of amortisation is, however, commonplace in costing today. The following items are among those which need to be considered for each of the two alternatives, almost certainly in yearly terms.

1. Structure
2. Maintenance
3. Lighting installation
4. Heating installation
5. Electricity charges for lighting
6. Lamp and lamp replacement costs
7. Fuel charges for heating

The annual structural cost, that is, the total cost divided by the number of years the building is expected to be in use, will be higher for the glazed roof than for the alternative, and so, significantly, will be that of maintenance.

The lighting installation will not differ very much in cost in the two cases, for any factory will be in use for a considerable time when daylight is inadequate. Where there is a difference, the installation for the opaque roof will be simpler and cheaper, both because there are less likely to be structural complications and because there is no need to compensate for light lost through the glazing. The life of the installation is likely to be the same in the two cases as this is much more a question of the total lapse of time than of an addition of the hours when the lamps are on. Obsolescence rather than disintegration is the usual stimulus to replacement.

The heating installation will need to be more extensive when it has to cope with the considerable heat loss through a glazed roof. Fuel charges will be correspondingly greater.

When the lighting is in use all the while work is going on, electricity charges and lamp and lamp-replacement costs rise, but in each case the difference is less than one might at first expect. This comes about first because every watt consumed by a lighting system ultimately becomes heat, and the heating system has to supply that much less, and secondly, because fluorescent lamp life, although stated nominally in hours, is really much more a question of switchings.

The amount by which the costs of structure, maintenance, and heating for the day-lit factory exceed those for the other requirements is in real terms, the cost of daylight. It is considerable. In fact, the result of exhaustive analysis along the lines merely sketched here is a surprisingly dramatic victory for permanent electric lighting.

It would be idle to deny that many people who appreciate the logic of this argument retain an uncomfortable feeling about it. There seems to be a threat of being deprived of something to which we feel we have a natural right—the light of day. This arises partly because the light that could be provided artificially has, until recently, been so different in both quantity and quality from daylight. Another cause is a deep-rooted desire for some sort of visual contact with the outside world. Side windows can, however, provide this; they have very little lighting significance and are already being spoken of as "vision strips."

This feeling seems to be the result of a relatively temperate climate. In the United States, with its great extremes weatherwise, a completely artificial environment is more acceptable and may even be welcomed. An office space of considerable length and depth has become known as "American type." Where this kind of arrangement is to be found in this country it normally has daylight from above, from a glazed roof in the office area of a single-storey factory, for example.

But in multi-storey buildings, in the great office blocks springing up around us, regulations on daylighting constitute a very severe restriction on building design, limiting the thickness of the block to the sum of the service core and twice the room depth, "D," which will produce the required daylight factor at the point furthest from the window, Fig. 2.

Hence the long, thin, high buildings which are beginning to dominate our cities. This shape seldom makes the most economic use of the available site, and in any case is contrary to the general principle of seeking the highest

* Mr Boud is with Philips Electrical Ltd.

possible ratio of interior volume to exterior surface area.

In practice, what do we find in such a building? That, in spite of its glass walls, the lighting is in use throughout the day. Among the reasons for this, two may be picked out. The first is the natural desire for the best conditions. Switching on the light will seem worth while if it increases the total illumination by 50% or more. A good installation will produce at least 30 lumens/sq ft; it will, therefore, tend to be used when the daylighting falls to 60. Even with a generous daylight factor of 2%, this means an outside illumination of 3,000, a figure probably reached only when the sun shines. Then, secondly, the large areas of glass will almost certainly lead to glare from the sky and the lighting will be used because an increased brightness inside will tend to lessen this effect. Thus, whether the day is dull or bright, the daylight will not be enough. We are accepting expensive and limiting restrictions to achieve a certain standard of daylighting and then finding that we need to switch the lights on anyway.

Fig. 1. In many American offices, with their large floor areas, a completely artificial working environment is approached. Jack Lemon in a scene from the United Artists' film, "The Apartment"

Problems with Supplementary Lighting

This illogical situation has been investigated with great thoroughness at the Building Research Station by Dr. Hopkinson and his colleagues. They rejected at the outset any idea of completely artificial lighting for offices and similar interiors. It cannot be stressed too strongly that the object of the many experiments, trials and calculations was that of finding the best balance, the optimum combination of daylight and electric light. In all this, human, aesthetic, and architectural considerations were given as much weight as the purely economic. It was considered axiomatic that the typical interior under investigation should retain the impression of being predominantly naturally lit, and that the permanent artificial lighting should be supplementary. We now speak of PSALI—permanent supplementary lighting of interiors.

The essence of the thinking behind the developments that have taken place can be most readily summarised in terms of the cross-section of a room with windows on one side only. Whether this is an office, as in Fig. 3, a classroom, a laboratory, or a hospital ward does not affect the general conclusions.

It is clear that with a particular ceiling height and on the assumption that the glazing of the window wall has reached its practical maximum, the selection of any least daylight factor automatically limits the depth of the room. If we want to make the room deeper we have two alternatives: make the ceiling higher or provide permanent electric lighting in the area remote from the window. The question, obviously, is "which costs more?"

It is too early to claim that there is a general answer, for costs vary with cases, but it can certainly be said that the economics of the two possibilities should be completely explored in each particular instance. With an increase in ceiling height, structural costs rise immediately, if for no other reason than that a larger building is necessary for the same accommodation. There is more air to be heated in each room and more glass through which heat is lost; with the extra glazing, cleaning costs more.

Against all this we have to consider the cost of the permanent lighting, and we cannot do this until we know what is needed. It is in the answer it provides to this question that the work carried out at the Building Research Station is so valuable.

The idea of a uniform lighting system over the whole room may be dismissed as inconsistent with that of balance between window and lamp (even though such a scheme will almost certainly be needed after dark).

Proximity to Windows

In Scandinavia and elsewhere supplementary lighting has been installed on the ceiling close to the windows so that its direction is similar to that of the daylight. But this system is more appropriate to an attempt at reproducing

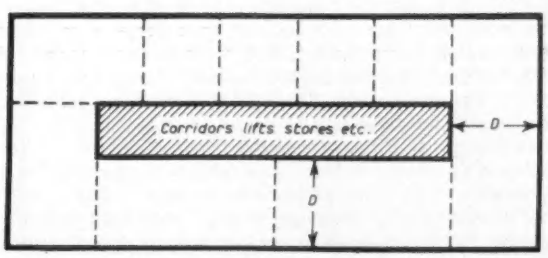

Fig. 2. Simplified plan of typical floor of modern office block

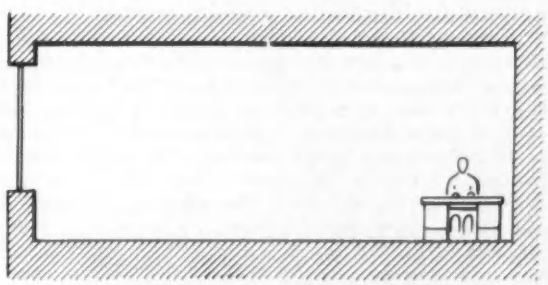

Fig. 3. Essentials of the office lighting situation

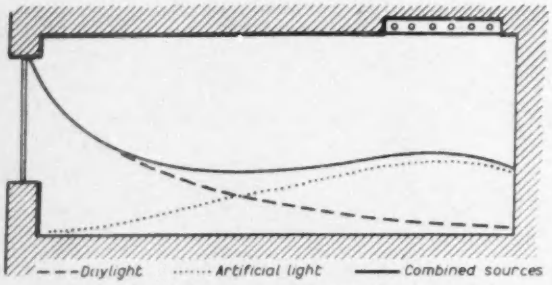

Fig. 4. Combination of two light sources

daytime conditions after dark and tends, during the day, to increase the apparent gloom at the far side of the room; it produces more light, as increasing the area of glass does, but it is attended by some of the same disadvantages.

The answer seems to be a source of light in the part of the ceiling further from the window. This might take the form of an artificial laylight with louvres or pan or corrugated diffusing material screening fluorescent lamps. There is no reason why the source should not be separate recessed or surface-mounted fittings, but the other approach is normally assumed because this kind of lighting must be part of the essential planning of the building and is, therefore, likely to be incorporated in the structure.

Once the best position for this lighting has been decided, the next question is "How much is needed?" The alternatives here are to provide what is necessary to ensure that at no point in the room does the illumination from the combination of sources fall below some minimum (say, the IES Code recommendation for general offices of 30 lumens/sq ft), or to settle the question of intensity on the grounds of the room appearance (on the reasonable assumption that the illumination criterion will incidentally be satisfied).

Personal Factors in Installations

At the Building Research Station a model of a typical interior was used. Observers were asked to adjust the dimmer which controlled the intensity of the lamps in a laylight until they felt the ideal visual balance had been achieved. Readings were taken for a large number of different sky brightnesses and a variety of forms of fenestration (clear glazing, horizontal louvres to reduce sky glare, and so on). The results have been published[1] and the views summarised.[2,3]

Although there was a considerable spread in the values selected in the experiments by different observers, it is possible to draw some general conclusions. On the grounds of balance, when it is bright outside, more light is needed inside. On the other hand, on a genuinely dull day there is a spontaneous wish to brighten the interior. Thus, although what was chosen was influenced by the sky brightness it is reasonable to suggest a fixed value for the supplementary lighting in a particular interior.

In a room with windows along one side and a minimum daylight factor of 1%, an appropriate level for the supplementary illumination is of the order of 50 lumens/sq ft, Fig. 4. To some ears this may sound high and the cost alarming. However, there is reassurance in the approximate costing made by the Ministry of Education for the case of the Preston Technical College, which has been designed on a PSALI basis. The extra cost of installing and running permanent lighting in six laboratories with a 10 ft ceiling height was compared with the extra cost of raising that height from 10 ft to 14 ft. The latter figure (without taking the extra heating bill into account) was £825 a year. With a level of 40 lumens/sq ft and an electricity charge of twopence a unit the additional yearly lighting cost was £129.

PSALI in Practice

It has been seen, then, that despite designing for daylight, lighting tends to be used throughout the day. This situation led to the examination from first principles of the whole question of the conscious combination of daylight and electric light. The results make it clear that in new buildings the relevance of PSALI should be examined at a very early stage in the planning; it can lead to great economies. It is also clear that many of the existing regulations about daylighting are outmoded.

For most of us, however, the important question is: how does this work affect our thinking about the lighting of existing buildings?

It suggests, first, that any lighting scheme for a daylit building has two functions: during the day and after dark. There may be a case in a small office, say, for the use of three fittings, two in the half of the room remote from the window and one in the other. There might be two switches, one "on-off," the other "day-night." During daytime the fitting near the window would not be in use, but the other two would provide, let us suppose, a supplement of 60 lumens/sq ft. Switching to "night" would mean one fitting on in each half of the room, a uniform 30 lumens/sq ft, and the same load as before.

Another effect of the attention being paid to the balance between natural and electric light has been increased emphasis on the importance of the right colour. A tungsten quality is welcome in domestic and social atmospheres and in many types of retailing. But it is inappropriate for a working environment, and particularly so where it is to blend with daylight. At the other extreme, Colour Matching, the coolest of the standard fluorescent colours, is going to be a match for the cooler end of the range of colour quality natural light presents. This is inappropriate, for it is a sound principle to relate higher illuminations to higher colour temperatures and vice versa. The level in the interior is going to be less than it is outside; the blend should therefore be with the warmer end of the daylight range so that the colour inside is never cooler than that outside. Moreover, the same colour quality will continue in the lower illumination of the night-time lighting. All of this suggests a source with a colour temperature in the 4,000°K region. If a very high efficiency lamp must be used, this means that Cool White (or Daylight) is preferable to White or Warm White. But undoubtedly the happiest results will follow the use of a de luxe lamp such as the double-coated Colour 34 (the after-dark effect will confirm the wisdom of this choice).

On the commercial plane, those of us who are concerned with convincing a possibly reluctant public that the illumination values in the new edition of the IES Code are not excessive, will find support from the levels which have arisen in the development of the theory of PSALI.

Finally, there is perhaps a sort of comfort inherent in this work for all those people who complain about their accommodation in the familiar words: "We have to have the lights on all day." For it suggests that it might cost them more if they did not.

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3. PSALI in Hospitals. R. G. Hopkinson. *International Lighting Review*, Vol. XII, No. 3, 1961, pp. 140-142.

ABOUT LIGHTMETERS

How Pocket Meters Can Help Sell Lighting

by A. D. S. Atkinson,* A.M.I.E.E., F.I.E.S.

A lightmeter is by no means a scientific toy. Properly handled, it is a business-getting instrument which can repay its cost the first time it is used.

MOST keen photographers with something better than the simplest of cameras have, or would like to have, an exposure meter to measure the light value of the scene to be taken so that the best shutter speed and lens aperture can be selected. Asked if they can't judge it by eye, they will reply to the effect that it's the film that has to be satisfied, not the eye, and that, anyway, the eye is an unreliable judge.

Basically, a pocket exposure meter and a pocket lightmeter are very similar. Both have a photoelectric cell which generates electricity when light falls on it, and the current moves a pointer over a graduated scale. The purpose of the two instruments, however, is entirely different. The former has to measure the average brightness of the scene that it can see; it is interested only in how much light is being *reflected* towards the camera by that scene, and not at all in how much light is reaching the scene. Therefore, the photocell of an exposure meter is well screened by a deep hood or louvre, so that no appreciable light from the sun or overhead sky can reach it and result in a false reading. A lightmeter, on the other hand, has to measure how much light is reaching the photocell from all sources, whether directly or by reflection, or both; therefore, it must be as nearly as possible completely unscreened except for a glass cover to prevent its being scratched or fingered.

How to Use a Meter

It should be obvious that if one is going to use a photocell device to measure the illumination falling on, say, a desk top, then the lightmeter must be put on the desk *with the photocell facing upwards;* similarly, to measure the illumination on a wall, the instrument should be held against the wall with *the cell facing the opposite wall.* Never mind where the scale and pointer are, they can always be read from somewhere; it's the position of the photocell that matters and it must always be in a plane parallel to the one on which the illumination is to be measured. All this sounds elementary but, apparently, it ought to be said for some of the readings reported to have been obtained by investigators—some of whom had probably just met a lightmeter for the first time—in a recent survey were, to say the least, improbable.

There may always be some controversy over whether the operator's shadow should be allowed to fall on the photocell. The IES Code recommendations for illumination values (e.g., 30 lumens/sq ft for general offices) are based on the premise that the lighting installation will be well engineered in other respects and therefore that, though there will be some shadows, they will be faint enough not to have a significant effect. On the other hand, a badly engineered scheme with too few fittings, or fittings in the wrong places with relation to the work, is likely to give rise to heavy shadow.

The meter is a convincing argument on lighting

For example, put a lightmeter in a (dry) domestic kitchen sink at night and switch on the light. Take a reading when standing well out of the way, then take another standing in the washer-up's usual position and (if the pointer moves at all in either case) there will be a remarkable difference between the two readings for, of course, for there is only one light, and that immediately behind the washer-up. Therefore it is generally wise to take two lightmeter readings in any situation; one unobstructed and one with normal obstruction, and to draw any conclusion that may be indicated by the discrepancy in the readings.

Planned lighting schemes in the office and industrial fields are, for the most part, intended to give a certain mean illumination at working level all over the area, with the minimum being not less than 70% of the maximum. It may, on occasions, be required to use a lightmeter to find the mean and the purist may suggest that a large number of readings should be taken at carefully calculated positions and the results averaged. In practice, however, if a pocket-type lightmeter is used there is not much point in going further than to find the maximum and minimum within the working area proper, ignoring any unused corners of the room, and to split the difference. The result so found is likely to be very slightly higher than the true mean. If the maximum to minimum ratio of the two measurements is greater than 100:70, it is not "general" lighting and "mean" has little meaning.

Things to Remember

British lightmeter scales are marked in "foot-candles" or "lumens/sq ft," which are the same thing. They may be marked additionally in the continental unit "lux," and about 11 lux=1·0 lm/sq ft. Don't get them mixed.

* Technical Editor, British Lighting Council.

Pocket lightmeters generally incorporate a small switch which multiplies the scale reading by five or ten. It is a good plan to make a habit of leaving the switch in the least sensitive position until the lower range is found to be required, so as to lessen the risk of damage to the movement if the instrument is overloaded.

Most lightmeters are calibrated for lighting by filament lamps, and the scale reading should be multiplied by a correction factor suitable to other kinds of lighting for a photocell does not respond to colours of light in the same way as the eye. These correction factors are marked on the instrument or instruction sheet, or can be obtained on request from the manufacturer.

Absolute accuracy is hardly to be expected from a pocket instrument but, given careful handling, it will continue to give the same reading in the same conditions for a long time. Nevertheless, periodical return to the manufacturers for checking is advisable.

Keep the glass cover of the photocell clean, otherwise it will read low. Light which comes from a shallow glancing angle tends to be reflected from this glass rather than go through it. The lightmeter is calibrated to take account of this effect in normal circumstances but, should all or nearly all the light in some particular situation be arriving at a glancing angle to the glass, the meter will give a false, low reading.

The use of pocket-type lightmeters is stressed in all the foregoing because most people who are, or ought to be, concerned with light measurement put portability as a first requirement. The pocket instruments are about the size of a couple of matchboxes and cost up to about £10 list. For laboratory use, or wherever precision is of greatest importance, there are, of course, larger, heavier and more expensive instruments with all kinds of refinements not called for in the pocket type.

Things to Use a Lightmeter for:

To show how the existing illumination compares in quantity with mandatory or recommended standards.

To show the rapid reduction of daylighting as one moves away from the windows, leading to the suggestion that electric lighting may be required almost permanently at the far side of working rooms.

To show the improvement in the lighting made by cleaning dirty lamps and fittings, leading to the drawing up of a suitable cleaning schedule.

To show the (perhaps unsuspected) depth of shadow cast by people or things, leading to the use of more appropriate fittings or a revised layout.

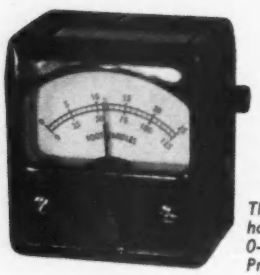
To show that you are fully equipped. Mere demonstration of the fact that light measurement is possible and easy is impressive to the uninitiated.

But most important—don't take measurements all by yourself. Take the manager or whoever is in charge of the lighting with you and get him, with tactful guidance from yourself, to do it for you.

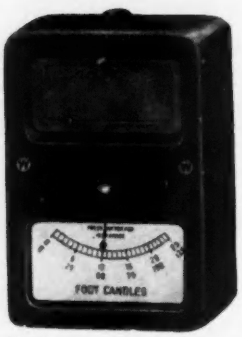
LIGHTMETERS

SOME BRITISH DESIGNS

The Avo "Model 2" lightmeter is a 2-range instrument 0-50 and 0-500 ft-candles Price £10



The EEL Mini-photometer has 2 ranges, 0-25 and 0-125 ft-candles. Price £6 19s 6d



The Sangamo-Weston 2-range S.85 photometer is priced at £7 7s 6d

IN the foregoing article, reference is made to the various types of lightmeter which have been designed specifically for the lighting engineer. Three models from the British range are shown here which will meet the needs of almost any industrial or commercial installation or situation, and the prices are modest for the high standard of design and manufacture entailed.

The Avo Model 2 has the largest range, the scaling being extended up to 250 candles/sq ft in the higher setting and up to 50 candles/sq ft in the lower. The scale is logarithmic, enabling the lowest levels to be read with an accuracy comparable to that of a precision photometer. The calibration is based on tungsten filament lighting, and the correction factor for fluorescent lighting is given in a table supplied with the instrument. The dimensions are $2\frac{1}{4}$ in. by $2\frac{3}{16}$ in. by $1\frac{1}{16}$ in. and the weight is 7 oz. The price is £10 and the makers are Avo Ltd., of 92-96 Vauxhall Bridge Road, London S.W.1.

The second instrument is the Weston Model S 85, also a two-range instrument but with a linear scale. This is less important since the scales chosen, 0 to 25 candles/sq ft and 0 to 125 candles/sq ft, enables the lower illumination values to be read with ease. A table of correction values for light sources other than tungsten filament is provided. Dimensions are 2 in. by 3 in. by $1\frac{3}{16}$ in. deep and the weight $5\frac{1}{2}$ oz. It can be obtained from Sangamo Weston Ltd., Enfield, Middlesex, and the price is £7 7s 6d.

The smallest instrument is the tiny pocket-size EEL "Mini-Photometer." Also a two-range instrument with a linear scaling, it is 2 in. by $2\frac{3}{16}$ in. by $1\frac{1}{8}$ in. and correction factors for lighting other than tungsten filament are engraved on the back cover. The price is £6 19s 6d and the makers are Evans Electroselenium Ltd., of Colchester Road, Halstead, Essex.

There are, of course, other British-made photometers which will give comparable service and results. The three shown can be considered as being representative of the standard to be expected from home-produced photoelectric lightmeters, both as regards dimensions and range.

Electrical Times, 7 September, 1961

FLEXIBILITY FOR LIGHTING

Millbank Tower Wiring Features

Lighting and power installation, to give comprehensive supply to office module layout not yet finalised, virtually completed during construction.

ELECTRICAL contractors concerned with installations in large buildings often have to tackle the problem of providing a competitive wiring system, but with sufficient flexibility to be easily adaptable to tenants' requirements. At the installation stage, not only are tenants' preferences for lighting fittings, switches and office machinery often not known, but the size of the offices may not definitely be fixed.

The article describes the system devised by Troughton and Young for the Millbank tower, a system which not only provides great flexibility to meet prospective tenants' whims but also makes extensive use of labour-saving factory prefabrication techniques.

The Millbank tower is the most striking feature of the development on a 3½-acre site which separates Thames House and other office blocks in Millbank from QA Military Hospital and the Tate Gallery. The tower, rising 387 ft above pavement level, comprises 34 storeys above ground and a basement. As well as the tower, the development includes an eight-storey block in the form of a "Y," a 12-storey flat block, conference hall, restaurant block, podium and three-tiered car park.

The site development has been commissioned by Legal and General Assurance Co. in conjunction with Vickers Ltd. and is being carried out by Messrs John Mowlem as principal contractors to the plans of the architects, Messrs Ronald Ward and Ptnrs. The project is scheduled for completion in the autumn of 1962 and will provide about 350,000 sq ft of office space, with 275,000 sq ft in the tower and conference hall alone.

Tower Layout and Services

The layout of each of the 34 floors in the tower block is essentially the same, with provision for office space on the outside perimeter and with about 30% of the central floor area devoted to services. These services include a high velocity, air/water air-conditioning system with refrigeration—no electric floor-warming is included in the design. There will be four local lifts serving floors one to 15 and five express lifts, with maximum speeds of 800 ft/min, serving floors from the fifteenth upwards. The central area of the tower also includes the main staircase, air-conditioning ducting and cable shafts.

The concrete floors rest on prestressed concrete beams and hollow tiles, providing an inter-floor spacing of 10 ft 9 in. The architects have stipulated that no electrical services are to be taken through the main floor area, but a space of 9 in. is available between the concrete beams and the office ceiling for electrical and heating services. The office ceilings will consist of demountable acoustic tiles, which are clipped on to a metal channel framework suspended from the floor beams and which also provides a convenient support for the lighting cable ceiling connection boxes developed by the electrical contractors specially for the job.

Fig. 1. A recent aerial view of the Millbank development site. The Tower rises 387 ft above pavement level. It is flanked on the left by a Y-block and spiral ramp for the car-park. A podium will link the Y-block with the Tower and a conference hall will be built on the right of the Tower. The flat block is in the foreground

Electrical Load

Although this article is concerned mainly with the means used to give flexibility to the office installation, some salient points of the electrical system are of interest. The total connected load of the tower is 5 MW and includes two 470 h.p. compressor motors. There is also a 520 h.p. compressor motor in the Y-block. These motors have auto-transformer starting, but for motors up to 30 h.p. rating the London Electricity Board have permitted direct-on-line starting.

The incoming electricity supply for the tower is brought in at 11 kV through four transformer rooms and two switchrooms in the basement, each of the two switchrooms in the tower block feeding one-half of the building. The incoming supply is taken directly from the LEB fuses, through a metering panel, to air-break isolators.

For distribution purposes, the tower floors are divided into three vertical groups and each group has duplicate busbars. The busbars are accommodated in shafts at the north and south sides of the building service area, each busbar feeding approximately one-half of a floor, although provision is made to interconnect between the two halves of the floor if required. Vertical rising busbars are used, rated 400 A t.p. and n. and housed in metal trunking with fire barriers at each floor level. The busbars and other services are fed from the two switchrooms through various sizes of p.v.c., s.w.a. cable, ranging from two-core 0·06 sq in. to four-core 0·25 sq in. The three duplicate busbar groups feed from the basement to the ninth floor, from the tenth to nineteenth floor and from the twentieth to the thirtieth floor. The remaining upper floors are fed from the landlord's supplies.

Floor Power Supplies

The vertical shafts for the busbar trunking are 13 ft wide and run the full height of the building. They also house the purpose-made fabricated sheet steel ducts for television, radio, telephone circuits and the main cables supplying the busbar risers and power supplies to the ventilation plant rooms at high level. The trunking and cables are held in position in the shaft by clipping to angle-iron cross-members grouted into the shaft walls. This arrangement does away with the need for cable trays and also allows slight movement over the height of the building. The load on each busbar is restricted to 300 A to comply with LEB requirements, and the load is balanced by splitting the floors between the three phases. At each floor the supply is taken from a distribution board with four 60 A h.b.c. fuses and then through four microgap switches to a bank of individual circuit fuses. Provision is made for four meters or more, if required. On a typical floor, 2 A to 60 A fuses and microgap switches control the lighting circuits, and two spare ways are provided on each distribution unit, the lighting circuits being protected by 5 A or 10 A h.b.c. fuses. The remaining two 60 A fuses and switches are for the ring main skirting duct circuits. There are four of these fed from each board, with an additional corridor circuit and a spare. Six fuses for these circuits are provided on the distribution board, rated 30 A. The distribution board layout is generally similar to that adopted for Bowater House (ELECTRICAL TIMES, 27 November, 1958), which has proved so successful in service. It will be noted that only the switchroom isolators are interposed between the incoming LEB fuses in the switchroom and the 60 A fuses on each floor distribution board.

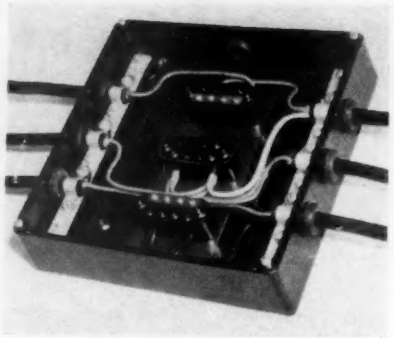


Fig. 2. Ceiling connection box with one incoming and six outgoing circular p.v.c. cables. Terminal blocks are for line, neutral and switch connections. The bare earth wires are connected to the cleat screws

From the floor distribution board, the single-phase 230 V lighting and power circuits are taken through one compartment of a vertical three-compartment trunking which runs up the cable shaft. This trunking is 7½ in. by 3 in. and the other two compartments house the floor interconnecting wiring and television cables. From this vertical trunking, a short length of single-compartment trunking carries the power and lighting circuits to link with the main distribution trunking. The main trunking has a rectangular cross-section, 6½ in. by 2 in. with a 2½ in. compartment for power and lighting connections and a 4 in. compartment for telephone, radio and television and other internal communications systems.

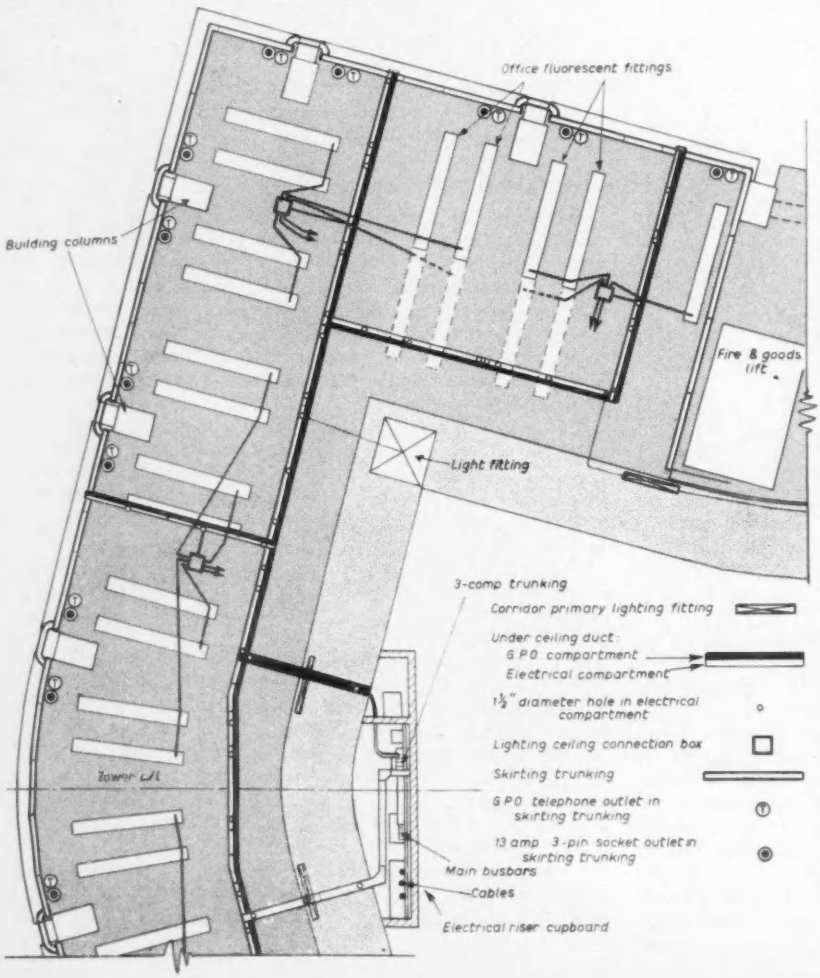


Fig. 3. Part plan of a typical floor showing location of office fluorescent fittings with possible additions indicated by broken lines. The under-ceiling trunking and skirting trunking are also shown

Under-ceiling Trunking

This trunking runs overhead, attached to the underside of the concrete floor members by clips, and passes through precast rectangular apertures in the concrete floor-beams. One main trunking serves each half of the office floor area and runs round the interior perimeter of the office space, with 12 spur runs from the main trunking out to the perimeter of the building.

At the tee-connections between the trunking, one overlaps the other, and in this way power and communication cables can be taken through these connections without resorting to restrictive cross-over in the trunking. This under-ceiling trunking is extended by risers through the floor at the outside perimeter of the building to feed skirting duct trunking on the floor above. Take-off points are provided on the overhead trunking at 3 ft intervals. These consist of a 1½ in. diameter hole in the trunking, to which a conduit box can be fitted with internal terminal blocks for the

lighting circuit connections. For easy identification, cover plates at cross-over and feed points are painted yellow. The skirting duct trunking round the outside perimeter of the office area is slightly smaller than the ceiling trunking. It is 7 in. high by 1½ in. deep, with the top section used for the ring main power circuits and the lower compartment for telecommunications. This arrangement allows for office machinery flexibles to fall neatly to the floor.

Skirting Ring Main

Take-off points consist of 13 A three-pin sockets, for fused plugs, flush with the trunking face. These sockets and the wiring are attached to the back of the trunking, so that access to the trunking is possible without disturbing the internal wiring or the sockets by simply removing the two retaining screws for the appropriate length of cover. The sockets are spaced on the perimeter skirting duct, and additional sockets may easily be installed if required by the tenant. On a typical floor, eight ring-circuits are connected for socket supplies, and initially six sockets are connected to a ring-circuit, therefore providing, if required at a later date by the tenant, easy facilities for the addition of extra sockets. Communication circuit cables are taken from the lower compartment of the skirting duct through rubber grommets.

Office Arrangement

The offices will be formed by positioning acoustic-panelled partitions, with acoustic ceiling tiles clipped to a steel framework suspended from the structure. The acoustic tiles are about 2 ft 1½ in. square. It will be possible to position switches and additional power outlets, if required, on the partition stiles and skirting trunking, supply being obtained either from the floor perimeter skirting ducting or from the overhead trunking, so that no connections through the floor or in the floor screed will be necessary. The bottom of the partitioning has skirting ducts with two compartments which line up with the floor skirting trunking. Where the main skirting trunking has to be connected round a building column, steel flexible conduit shrouded with p.v.c. is used. The partitioning will consist of acoustic panels approximately 4 ft 3 in. wide and 9 ft high, mounted between vertical rectangular sheet steel stiles. The skirting trunking at the bottom of the panels will be alternately reversed. Wiring can be taken through the skirting duct and up through the stiles. Alternatively, it can be continued from the perimeter skirting duct which lines up with the partition trunking. The main building columns are spaced, in general, at 17 ft intervals. The offices are planned on a 4 ft 3 in. module giving a minimum width of 8 ft 6 in.

Circular p.v.c. Cable for Lighting

From the overhead ceiling trunking, the lighting supply is taken through special p.v.c. cable to ceiling connection boxes. These boxes were developed for the Millbank installation. They are cast iron and have provision for one incoming and six outgoing circular cables. The cables are brought in through rubber-grommeted openings in the side of the box and retained by cleats. Internal connections are made on three six-way terminal blocks for line, neutral and switching. The circular cable is 3-core or 4-core 3/0·029 sq. in. p.v.c.-insulated, 0·025 in. radial, laid up with a bare earth conductor of the same cross-section as the line conductor. The cable is taped and sheathed overall with p.v.c. for 250/440 V circuits.

Installation Flexible for Tenants

The trunking system described, with its internal wiring and connections to the ceiling junction boxes, comprises the permanent part of the installation. The layout has been planned so that the distance from the distribution board to the furthest point of a circuit will not exceed 100 ft. It has also allowed extensive prefabrication of trunking and ceiling boxes in the factory, and all wiring up to the ceiling junction boxes has been completed before the ultimate tenant's requirements are known. The system has the advantage that wiring can be completed to the ceiling connection boxes while the building is being completed.

When the tenants' requirements from lighting, switch positions and office machinery sockets are known it will only be necessary to run connections from the ceiling junction boxes, across the ceiling modules, either to the fittings or down the partition stiles to the switches. The special circular p.v.c. cable will be used for these connections. Drilled and bushed entries are provided in the tops of the partition stiles to take this cable. The partitioning system will thus allow connections to be taken either from the ceiling trunking or from the skirting trunking, and a typical layout to negotiate a door in the partitioning is shown in Fig. 7. Certain of the corridor and service area lighting circuits will be on the tenants' supply, but these will be permanently wired in conduit.

Lighting in the offices and in the corridors is intended to be mainly fluorescent, based on 8 ft fittings partially

Fig. 4. View of the riser cupboard during construction. The busbar trunking in the foreground is attached to angle iron which will eventually also support cables to higher floors. The trunking shown above the fuse board has three compartments for lighting and ring mains, floor interconnection wiring and television circuits.

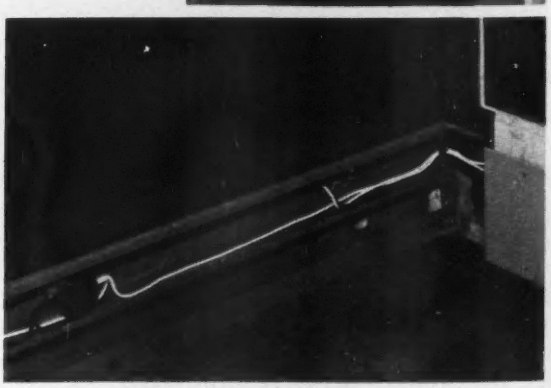


Fig. 5. Skirting duct with cover removed showing upper ring main compartment with 13 A socket and lower communication compartment. The ring main is taken round the column base into the partition as shown on the right

recessed into the module ceiling, with control gear mounted above for office areas and using 4 ft (fluorescent) fittings for the corridors.

Apart from the obvious advantages of permitting almost any combinations and positions of lighting and power sockets to suit tenants' requirements without altering the permanent installation, the system enables time and labour on site to be considerably reduced by permitting a high proportion of prefabrication off site. It also overcomes the need for through-floor holes, unless, of course, the tenant insists on an outlet in the middle of the floor, which could, however, be provided but which would require a small hole through the floor.

Acknowledgment is made to Mr J. Flood, director, Troughton and Young, for information concerned with the installation, to Messrs Ronald Ward and Ptnrs and Messrs John Mowlem and to Messrs Vickers for the heading illustration.

▲ *Fig. 6. Ceiling connection box in position on the ceiling framework. The incoming supply is taken from the ceiling trunking through a connector and compression gland by p.v.c. cable. Outgoing cables for lights and switches are shown in position for subsequent wiring into the office partitions*

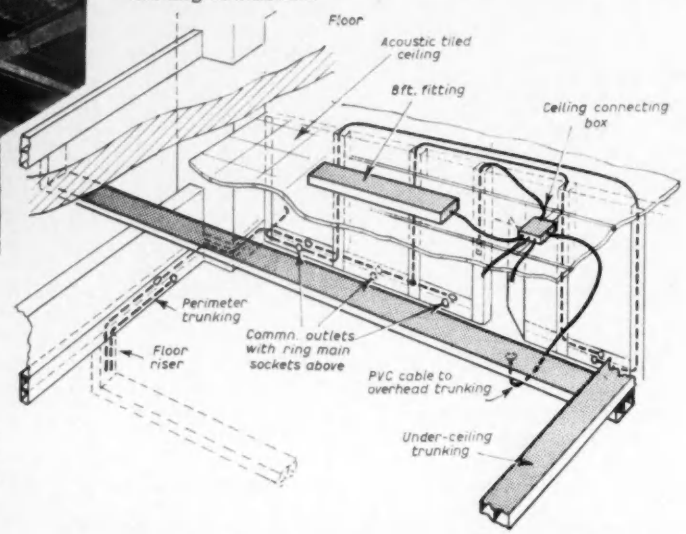
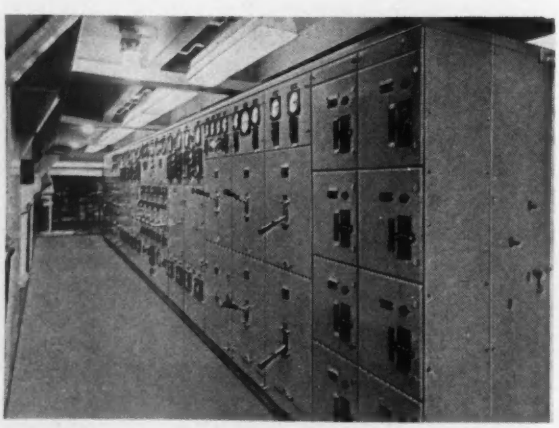


Fig. 7. View of probable office layout showing ring main and communication sockets available in each office on alternate panels. The diagram shows how wiring could be taken round a partition door and connected to a ceiling box ▶

Wiring in Ships

BESIDES its famous work in publishing rules for electrical installations in buildings, the IEE has, since 1919, issued a code of regulations for the electrical equipment of ships. The first full post-war edition of these regulations has now been issued, taking effect from 1 September.



Representative of marine electrical engineering is this 380 kV 60 c/s switchboard by Whipp and Bourne for the TSS "Principe Perfeito." It provides controls for three main and two diesel alternators and for an incoming 2,000 A shore supply

In layout, the regulations are similar to those for land wiring, but the section on "general requirements" introduces a sharp reminder of the different conditions being faced. Cooling air temperatures as high as 113°F are assumed for ocean-going ships, and machines and apparatus have to operate satisfactorily with a 15° list or a 20½° roll, plus an inclination of 10° fore and aft.

The regulations are divided into 26 sections, covering most of the expected categories. There is a separate section for installations in tankers, and another dealing with electric propulsion plant. Types of cables that may be used on shipboard are the subject of a list which includes v.r. insulation, butyl rubber, impregnated paper and varnished cambric. M.I.C.C., p.v.c. and silicone rubber are also recognised, and polychloroprene for sheathing.

An appendix to the regulations gives appropriate extracts from the 1960 Convention on Safety of Life at Sea, which is expected to become the subject of statutory enforcement when it has been ratified. The Convention includes requirements about duplication of generating sets in passenger ships in which electricity is essential to maintaining auxiliary services necessary for propulsion or safety. It also lays down requirements for emergency sources of power in passenger ships and cargo ships, and generalised requirements for precautions against electrical shock and fire risks.

The regulations are obtainable from the IEE, Savoy Place, W.C.2, price 7s 6d bound in limp cloth, or 10s hard bound, postage included in both cases.

LIGHTING ON THE FARM

Ideas for Equipment to match New Types of Farm Building

by P. H. N. Turner*

IT is fair to say that artificial lighting in the majority of farms is of a poor standard. An abundance of electric light seems to the author to be so essential to the production and efficiency of the farm, and to the safety of farm workers, that a lack of good lighting appears to be one of the major farm problems in this country today. It is, therefore, all the more disappointing to see that the new National Lighting Code issued by the Illuminating Engineering Society, which marks the first major revision in lighting standards since 1941, seems to consider that operations carried out on the farm require less illumination than similar operations undertaken in other industries.

Farms range in size and condition from the ideal layout to be seen in the show places, where capital has been spent lavishly, although no doubt judiciously, to the modest smallholding where resources are few and conditions far from ideal. In stating that the majority of farms are poorly lit, the author is referring to the vast majority of farms lying between these extremes. The old traditional type of farm with separate detached buildings is rapidly changing. The older buildings in the farmstead were erected to meet husbandry practices then in vogue, and they may be entirely unsuitable for present-day methods. Some can, of course, be adapted to meet modern standards, but this is an expensive business. The old buildings, attractive as they are with their brick or stone walls and tiled, slated or thatched roofs, are difficult to modify to conform with the regulations required for, say, the higher standards of milk production.

The farmer has been forced, then, to seek out new methods of construction which will conform to certain basic demands—cheapness, quick delivery and ease of erection. To meet these, he has turned to the prefabricated types of structure. These can be divided into two broad categories: those which house livestock and those used for storage. Both types consist of reinforced concrete or steel frames having walls of various types, pre-cast concrete blocks (solid, hollow, vibrated or cellular) or sheeting of flat corrugated or channelled asbestos cement, corrugated iron or protected metals. In the near future we shall see an increasing number of an entirely new type of building —a building which will house both the livestock and their food and bedding. This major change in building design has been forced upon the farmers in an attempt to reduce the cost of labour in producing milk; the idea is to place all materials where they are wanted, to save double handling.

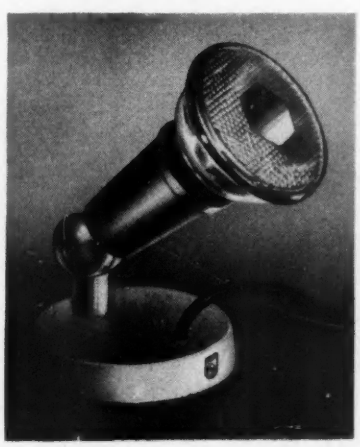


Fig. 1. This 150 W reflector lamp by Philips Electrical is a weatherproof adjustable fitting suitable for outside use around farm buildings

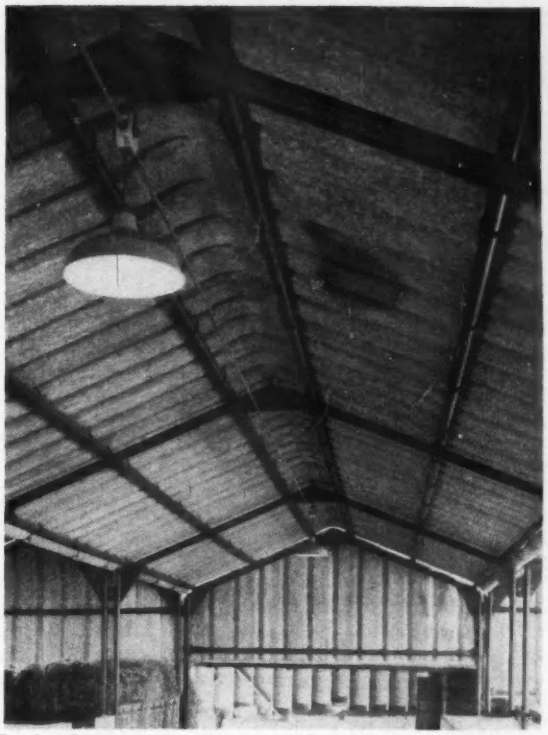


Fig. 2. Grid suspension scheme in use for lighting a tall farm building

The dual-purpose type of building, which includes a covered yard, has very large areas which require artificial illumination. For these reasons, and because of the Government's recently introduced schemes of monetary agricultural assistance such as the "Farm Improvement Scheme" and "Small Farm Scheme" (by which farmers receive generous grants towards improving the design and layout of their fixed equipment, such as the erection of new buildings), anyone taking even a short trip around any county will notice an increasing number of new buildings that have sprung up on the farms within recent years; the most noticeable change in design being the high walls and large sweeping roofs.

The meet these major changes in design of farm buildings, surely the electrical industry must reconsider the method of installing lighting. It would seem that the higher the roof the higher the lighting fitting, and not much thought appears to be given to the essential, that good

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lighting should be lighting of the "right kind" and the "right amount" at the "right place." The time has now come for the development of special lighting fittings and techniques for farming use.

Spot Lamps—Outside

A type of lamp and fitting not yet used to any great extent in this country is the weatherproof adjustable fitting for 150 W pressed glass reflector lamp (see Fig. 1), made by Philips Electrical Ltd. It is, in the author's view, ideal for many outside applications: for example, to illuminate well-used routes, building entrances and obstructions.

Of course, ideally, the whole of the farmstead area should be illuminated, but this can very rarely be achieved due to reasons of economy; false economy, some would say, as the number of mishaps and accidents due to badly illuminated outside areas is considerable. The author's suggestion of "spotting" danger areas is a practical compromise which should appeal to the farmer. This fitting is adjustable through 180° in the vertical plane and 360° in the horizontal; the construction is cast aluminium with a silicone rubber sealing gasket and porcelain ES lampholder—the fitting is supplied unwired with an earthing screw located inside the knuckle joint.

As an alternative to the heavy steel or aluminium open-type floodlight projector which is usually used for providing general illumination outside, there is a floodlighting equipment marketed by DR Illuminations Ltd., of Stockport (Figs. 3 and 4), which seems to have much to commend it:

(a) The reflector is made of lightweight fibreglass.

(b) Completely weatherproof neoprene GES lampholder.

(c) Very simple method of fixing by means of special dual fixing clamp.

Everyone knows how the light rigged up hastily as a temporary measure gets left in position. Here is a fitting which can be installed quickly and is safe to leave permanently. Indeed, it is eminently suitable for a well-designed permanent installation, the all-insulated and completely non-corrosive construction being particularly attractive for use on a farm. It is encouraging to see at last a positive move to the use of all-insulated materials such as fibreglass, which combine mechanical strength with insulating properties.

Spot Lamps—Inside

The principle of "spot-lighting," it is felt, should be used inside the farm as well as outside, in buildings with high ceilings such as Dutch barns, covered yards, etc. Very frequently a Dutch barn is a favourite place in which to install a grain and grass drying plant, and far too often the only means of illumination is by means of dispersive reflectors fixed direct to the roof members or suspended on flexible cable. A higher light intensity is obviously required adjacent to the actual working area around the crop drying plant, and surely the most efficient and least expensive way to achieve this is by the use of the "spot-light" previously suggested for outside use. As the cast aluminium base plate is not necessary and, indeed, not advisable, the fitting could be cheapened and made more suitable for this suggested indoor use if the pressed glass reflector lamp could be mounted in an all-insulated lampholder together with a simple fixing bracket.

Philips Electrical Ltd. have been approached and have suggested an asbestos lampholder body and cable gland, with a steel mounting bracket (Fig. 5). The watertight cable gland will take 23/·0076 twin-core circular flex or 3/·029 twin-core circular cable. This fitting will shortly be available and the list price should be under £1, plus lamp. The author would like to think that all electrical representatives dealing with farmers would have one of these fittings available for demonstration to show the farmer how simple and inexpensive it would be to raise the standard of illumination at the various working areas on his farm, such as crop drying plants, implement sheds, milling and mixing, preparation of rations, etc. All these processes surely merit illumination values approaching those recommended for other industries.

Bulkhead Fittings

A plea for the use of "all-insulated" bulkhead fittings! For illuminating low ceiling piggeries, calf boxes and many other places, bulkhead fittings are really the only practical solution, but why use metal ones? They are always subject to corrosion, they are heavy and they need to be earthed. Modern all-insulated bulkhead fittings are light in weight and are corrosion proof. "Loblite," Gateshead, have now a greatly improved range available. An example of this range is shown here (Figs. 6 and 7), and they are now available in brown or white finish. These fittings are designed to take ¾ in. plastics conduit or p.v.c. cable—the cable entry being really watertight.

Buildings With High Ceilings

Not a great deal of use has been made up to date of "Enfield Grid Suspension" as a means of providing circuit wiring for lighting in farm buildings, but perhaps the advent of the new type of farm building will popularise this system.

Buildings of pre-cast concrete and steel frame construction present many difficulties to conventional methods

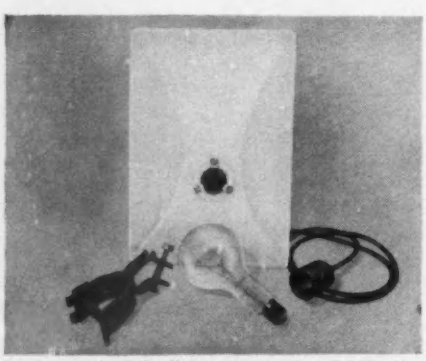
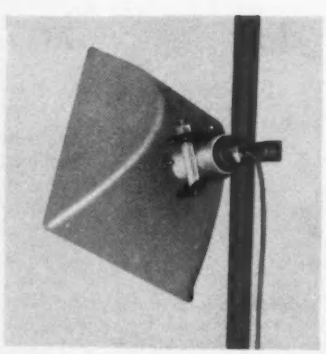


Fig. 3. Details of floodlighting equipment (DR Illuminations Ltd.)



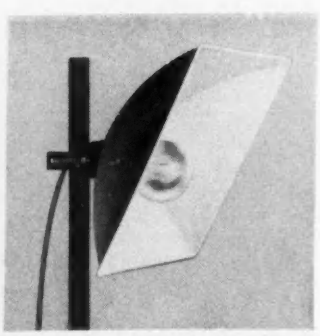


Fig. 4. Two views of the assembled form of the fitting shown in Fig. 3. The reflector is made of lightweight fibreglass

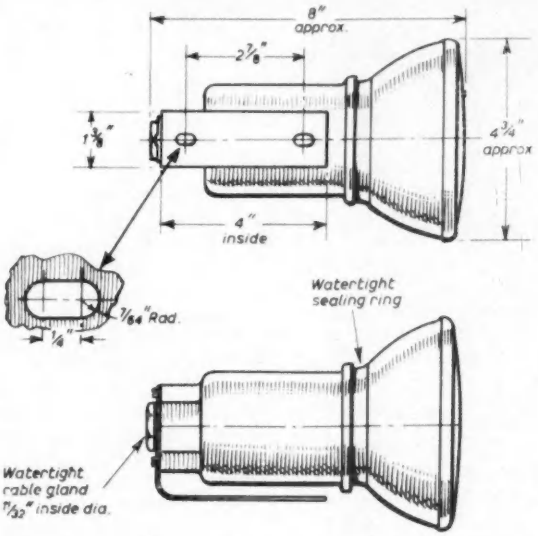
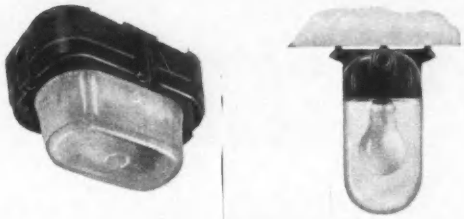


Fig. 5. Details of design of spotlight for inside use, incorporating asbestos lampholder body and cable gland and steel mounting bracket (Philips Electrical Ltd.)

of wiring, some of which will be revealed by a brief examination of Fig. 2. The grid suspension system has marked practical advantages resulting in lower installation costs. If the circuit wiring costs can be reduced, it should follow that the farmer will be more receptive to accepting a greater number of lighting points obviously resulting in a higher illumination standard.

For those who may not have had previous experience of this system, there are but two basic components, the cable and the boxes. The cables consist of p.v.c.-insulated cores laid up spirally around centrally-disposed catenary wire, suitable fillers are inserted to produce an overall circular construction, and the whole assembly is encased in a p.v.c. sheathing. The boxes are octagonal in shape and are made from die-cast aluminium alloy and are available in a p.v.c. finish if desired. Inside each box is an anchoring device by means of which the catenary wire is taken round three bosses on the bottom plate so that ample slack on the conductors is available for jointing purposes. Conductors are not cut when a joint has to be made so that possible mechanical and electrical faults are reduced to a minimum.



Figs. 6 and 7. All-insulated bulkhead fittings by Loblite, Gateshead

The length of cable to suit the job, complete with lighting fittings, can be pre-assembled ready for erection and the electrician has merely to lift the harness into position.

Conclusion

Modern farming methods require modern techniques for lighting. In the interests of the farmer and the electricity boards, every effort should be made by those who come into contact with the agricultural community to sell the idea of better standards of artificial illumination and, having done this, to see that the method of installation and type of fittings used reach the same high standard.

Acknowledgment. The author acknowledges with thanks permission to publish this article, granted by Mr A. M. Harker, manager, Mid-Sussex sub-area, SEEB.

Power Statistics

UP-TO-DATE figures for electricity supply are reported monthly in our "Power Supply" page; and more extensive analyses are presented in our summaries of the electricity boards' annual reports. There remain some aggregated statistics that escape the net, however, and some of these find their way into the many tables that make up the Ministry of Power's annual *Statistical Digest*, the 1960 edition of which has just been published. Particularly valuable are some of the figures for 1960 experience of the supply industry in the whole of the UK, arranged on a calendar year basis rather than by financial years.

Generation Statistics

On this basis the present report notes that public supply in the UK sent out 116×10^9 kWh in 1960, compared with 102×10^9 kWh in 1959; in both cases after export of about one million kWh to Eire. Industrial producers generated for their own use 14×10^9 kWh, against 13×10^9 kWh in 1959, giving a 1960 aggregate of 130×10^9 kWh.

Generation in industry is dominated by the chemical and allied trades, a classification taken to include the UKAEA with their nuclear power stations. Together, they account for nearly 40% of industrial generation, with chemical works other than nuclear responsible for 25%. Other big self-producers are iron and steel (19%) and paper, printing and stationery (16%).

Maximum load met by public supply during 1960 is estimated for Great Britain only as 27,081 MW, compared with 25,549 MW in the previous year. This gives the relatively high plant load factor of 43·1% and system load factor of 47·0% but these figures have to be treated with caution, as the loads aggregated are not simultaneous.

Fuel and power industries other than electricity are dealt with in the *Digest*, and the figures here again add to the information available on electricity supply. The coal figures, for example, show how important is electricity supply to the sale of low-grade coal. Of the 41 million tons of large coal produced by the NCB, power stations took about 0·1%, but when it comes to "slacks and smalls" the electricity share of the 95 million tons sold in 1960 rises to 50%. Overall, the supply industry took over 26% of NCB sales in 1960.

Statistics for fuel oil sales over recent years stress the increasing importance of public electricity supply. In 1960, supply took 34% of the 16 million tons of fuel oil sold for burning, as compared with 10·5% of the 6 million tons sold in 1957. The supply industry has, in the last two years, become the largest user of fuel oil for burning.

The *Digest* is published by HMSO, price 27s 6d.

Electricity supply in South Africa

ESCOM'S 38TH ANNUAL REPORT SHOWS PROGRESS

AN increase of 9·3% in the units sold with an 84% reduction in bought-in units marks the progress over the past year of the Electricity Supply Commission of South Africa as disclosed in the 38th annual report. By the end of the financial year on 31 December, 1960, the generating capacity from thermal stations had reached the figure of 3,350 MW and electricity sales had risen to the record figure of nearly 16·1 thousand million units. While increases of consumption were recorded from all seven individual undertakings, they were most marked in Eastern Transvaal (20·3%) and Natal Southern (14·7%).

Rural Electrification

One of the main drives in all of the undertakings has been on rural electrification. In 1960, 623 farms were brought on supply making a total of 1,688 since the drive was started three years ago. Although the farms represent the focal point of each extension, to achieve the most economical terms for the consumers, a simultaneous drive to secure all potential consumers in the area is also getting results. For example, apart from 88 new farm conections in the Cape Western Undertaking, the same extensions also supply 594 new consumers, including eight large users.

Transmission Systems

Considerable progress has been made with overhead transmission systems during the year. Lines completed total 239 miles, including 197 miles at 88 kV. A further 1,227 miles are in hand, of which 762 miles are at 132 kV, 314 miles at 275 kV and 126 miles at 88 kV. The 132 kV lines include the 440-mile double-circuit link between Hex River and Beaufort West and the 102-mile Machadodorp-Lydenburg-Penge section; the 275 kV lines includes the Komati-Nevis link. Further lines projected are 163 miles at 66 kV, 175 miles at 88 kV, 147 miles at 132 kV and 381 miles at 275 kV. The latter includes a 320-mile link between Ingagane and Georgedale.

Power Stations

During 1960 a 120 MW unit was commissioned at Highveld and considerable progress was made with the Komati 500 MW station (where the first set is due for commissioning shortly) and with the 200 MW Ingagane station. Other units under construction or ordered during the year include a 60 MW set for Hex River, a 15 MW set for West Bank, an additional 120 MW for Umgeni and a similar increase for Highveld.

Traction and Mining

The extension of electrification on South African Railways systems has also been reflected in the large increase of sales which, at 1,045 million units, is 17·8% up on 1959. To serve the new extensions, five new substations on the Eastern Transvaal and two on the Rand and OFS system were installed with a further 11 mercury-arc rectifier stations on the Natal system; three of these replaced motor generator substations. By 31 March, 1960, 2,708 miles of track—about 15% of the South African railway system—had been electrified.

Supplies to the mining industries were up by 570 million units, or 7·3%, while other heavy industries—notably the new ferro-manganese project of Feralloys Ltd., the new nitrogen works of African Explosives and a newsprint mill for SA Pulp and Paper—also increased their demands.

ELECTRICITY SUPPLY COMMISSION. INSTALLED THERMAL PLANT, 1960

Power station	*Cap. MW	Sets and MW Ratings	Load Factor	Thermal** Efficiency
Braakpan	48	1-3, 2-12·5, 1-20	16·1%	14·1%
Central Kimberley	30	1-3, 3-5, 2-6	33·2%	13·9%
Colenso 1 & 2 ...	165	5-12, 3-25, 1-30	63·6%	20·1%
Congella 1 & 2 ...	206	3-12, 1-20, 1-30, 3-40	52·8%	22·4%
Hex River	60	3-20	41·9%	24·2%
Highveld	360	6-60	68·6%	30·9%
Klip	396	12-33	79·8%	21·9%
Rosherville ...	38·4	4-9·6	—	10·4%
Salt River 1 & 2 ...	210	3-10, 3-20, 4-30	6·8%	15·7%
Taaibos	480	8-60	76·6%	28·2%
Umgeni	120	4-30	60·7%	25·3%
Vaal	297	9-33	78·1%	22·5%
Vereeniging ...	157·5	3-20, 3-32·5	70·5%	16·4%
Vierfontein... ...	320	12-30	53·2%	24·8%
West Bank 1 & 2 ...	62	1-1·5, 2-4, 3-7·5, 2-0·15	54·8%	22·7%
Wilge	240	2-30, 3-60	76·9%	27·8%
Witbank	120	6-20	68·9%	16·6%

* Exclusive of house sets. ** As generated.

Tariffs

In six of the seven undertakings no general change in tariffs occurred during 1960, but in Cape Western the tariffs were increased by stepping up the surcharge from 5% to 10% in August, 1960. For the current year, however, the two Natal undertakings have increased tariffs by imposing a general surcharge of 5% from 1 January, 1961, though in the coastal areas of Natal Southern this is offset to some extent by a reduction of surcharges in January, 1960, from 50% to 40% for industrial users and 30% to 25% for domestic users. In the current year, Rand and OFS are increasing the general discount from 3% to 5%.

The increases are to some extent due to increased cost of fuel arising out of the Coalbrook North colliery disaster in January of last year, which ultimately resulted in the closing down of the whole of the North Colliery. As a result supplies had to be re-routed from other sources with a large increase in railage costs.

Financial

Although three of the undertakings continued to show a deficit on the year's working, the accumulated surplus for the year at £550,134 was up on last year's figure and enabled the deficit of £156,773 brought forward from 1959 and previous years to be eliminated and an accumulated surplus carried forward of £469,752. Total revenue is up 12% at £40·9 million.

NOTES ON WIRING

BY MEGOHM

CORRESPONDENCE regarding the activities of spare-time electricians continues to reach me, and with each letter I grow more amazed at these activities. Most of the letters are "confidential" and the whole matter has now become a "cloak and dagger" affair. There are allegations of officials shutting their eyes to such goings-on by their staff because of shortage of skilled men. Equally serious are references to the methods by which these people obtain their materials.

All these allegations I must take on face value, because most of the people who make such suggestions do not wish to have their names published. However, I, personally, believe them, or at least agree with them, because of my own investigations. With regards to putting a stop to their practices, that I fear is a difficult job. One suggestion, by a correspondent, is that whenever such a job as rewiring a house is done by spare-timers, the client should ask for a proper invoice for the work, which can be set against Schedule A tax, or, if this is not forthcoming, the Inland Revenue should be notified. Of course, the second of these suggestions might be distasteful to many.

All this is very disturbing indeed and to my way of thinking these people should branch out on their own completely. Then they might appreciate the feelings of their present employers.

Safety

I am most interested in the latest regulations for building contractors which come into force in March, 1962. Although a safety supervisor appointed under the regulations will be responsible for general safety precautions, I feel that he will need to have some electrical knowledge to cope with the many electrical aids to building work which are in use today. Such knowledge is also necessary to deal with the many "temporary" arrangements for lighting, etc., certain of which, I feel, are far from being safe. If one looks at conditions which prevail on a building site, the work of such a safety officer could be most complicated. Normally, the electrical contractor is subcontracting to the builder, and during actual building operations the builder uses much more electrical apparatus than the electricians do. It would seem, therefore, that the safety officer employed by the *builder* must have considerable electrical knowledge to be of decisive value. On the other hand, a safety officer nominated by an electrical contractor must, in my opinion, be capable of dealing with scaffolding, ladders, etc. Electrical contractors, paradoxically, do not use a lot of electrical apparatus on building sites.

I have seen building sites festooned with electric cables serving lights, vibrators, hoists and electric hammers, yet the appointed electrical contractor was not started on site. The temporary cables had been installed by someone with "a fair knowledge" of electrical matters. This was not by any means an isolated case of temporary wiring being done by a semi-skilled employee of a building contractor. The smaller the site, the more chance of this happening, and it will be most interesting to watch developments in connection with this matter.

Of course, many people, including myself, will voice their opinions on the matter, and it is just such a situation where "officialdom" *could* come into its own. I mean by that, that the employment of a safety officer could be guided by some official body who could concoct a frightening official guide or book of rules to assist these gentlemen. Let us hope that this does not happen and that the building trades get together and, if necessary, agree amongst themselves a code of practice for the guidance of these officers.

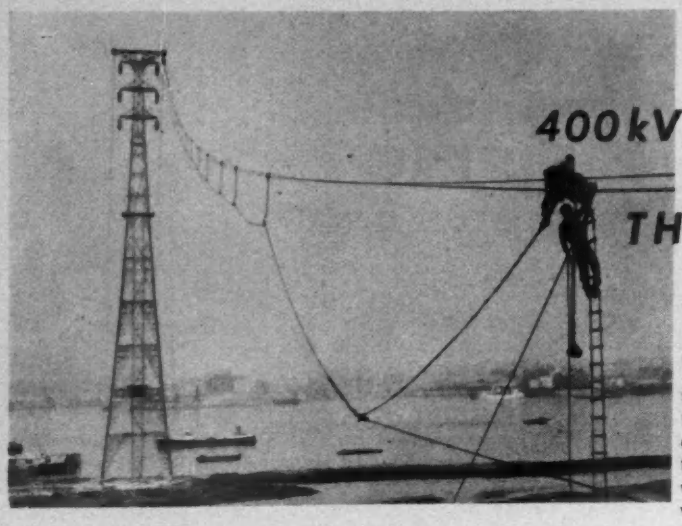
This, I feel, is another case where a *practical* man rather than anyone with technical knowledge should be put in charge. This is a job that can be only partially learned by books and college training. It is a down-to-earth practical job where site experience will count. Age, too, may play a part, for there is one factor which helps the practical-minded man, and that is the time he has spent on the actual work. The necessity of such officers may well lead to the creation of a new trade or association, and I consider that some older employees could well be usefully employed as safety officers. Men who know the value of taking time to look around and not trust to luck. Many times during my apprentice days I felt the hand of an older man on my shoulder and heard advice that slowed me down and made me *think* before doing something.

Better Lighting

As we draw nearer to the date of the opening of the Better Lighting campaign, I have been doing a little survey work during my travels. Of course, I should really start in my own offices and try to make life easier, but I have met some opposition to fluorescent lighting. However, after peering into some London basements I feel that there are other places more in need of attention than my office. The modern or up-to-date office has, of course, been in the hands of the expert who knows that good lighting is essential for keeping up the efficiency of the organisation. Large firms who are in old premises are able to afford the cost of calling in an expert.

It is rather different in the case of small firms. They mainly rely on the services of the contractor "round the corner," and it will be interesting to see if this class of contractor has kept himself up to date with new lighting levels. All too often this work is "guess work" and many odd results are seen. Fittings manufacturers do a great deal to overcome this problem, but even their advice is not always taken to heart. A serious side of this is, of course, that where bad lighting is noticed by the general public the fitting is often blamed, and I have known such a thing to prove detrimental to the manufacturer.

I sincerely hope that this drive for better lighting has far-reaching results. Our offices, homes and streets are all too often badly lighted, and by that I also mean badly planned, as far as lighting goes. I have remarked before in these columns that even cupboards should be fitted with lights and outside doors brightly illuminated. By doing this, general health can be improved and many accidents avoided.



400kV ACROSS THE THAMES

630 FT TOWERS CARRY SUPERGRID 250 FT ABOVE RIVER

Fig. 1. Removing a holding rope attached to a conductor dead end from the front of the south anchor tower

A VITAL link in the CEGB supergrid, which will eventually operate at 400 kV and initially at 275 kV, is now nearing completion. Two towers rising to 630 ft carry a double-circuit connection high above the Thames in a single span of 4,500 ft from West Thurrock, on the north bank, to Swanscombe. The six phase conductors have now been erected and erection of the similar earth conductor began this week and is expected to be completed in three weeks.

The West Thurrock crossing spans the site of the CEGB 1,000 MW station now under construction on the north bank of the river, while the southern end will link with new lines interconnecting Canterbury, the cross-Channel d.c. cable and the Dungeness nuclear station. With a firm capacity of 1,000 MW, which is also the rated capacity of each circuit, it will constitute the first section of a supergrid ring which will eventually encompass London.

The unusual height of the towers was required to meet a stipulation by the Port of London Authority that the minimum height of the conductors above high water should be 250 ft. Stringing the conductors also posed some unusual problems to meet the CEGB requirements that at no time should the conductor touch ground or enter the water. This stipulation was necessary to prevent the likelihood of abrasion or corrosion of the conductors, which could result in corona, in turn giving rise to television reception interference. For the same reason, attachment of clamps and haulage devices to the conductor was prohibited. The site of the crossing is adjacent to a cement works on the south side of the river, while on the north side the conductors cross West Thurrock power station. Intensive research was therefore required on suitable conductor impregnants to guard against corrosion.

Fig. 2. Crossing tower elevation showing erection of a suspension insulator on the crossing tower. Each assembly comprises six strings of 20 by 14 in. dia porcelain units

Largest O/H Conductors Yet

The steel-cored, aluminium conductors manufactured for the West Thurrock crossing are the largest of their kind used in Great Britain. They were designed by the Wire Mill Division of BICC in collaboration with the CEGB. Each conductor consists of a core of 90/0·123 in. dia preformed galvanised steel wires of 120-ton quality wound in five layers over a central wire 0·132 in. dia. Wound in two layers over the core are 74/0·133 in. aluminium wires surmounted by a final layer of wedge segmental aluminium wires, 36/0·0266 sq in. and 0·16 in. deep.

The segmental wires give a smooth outer surface to the conductor to reduce the aerodynamic effects, which could promote swinging on such large spans.

Each conductor has an overall diameter of approximately 2·214 in. and nine lengths have been supplied, two of which are spares, having unstressed lengths of 7,754 ft at 60°F. Because of the nature of the crossing, dead ends were fitted to the conductors in the factory. This required the overall length to be extremely accurate and, in fact, a tolerance of ±1 ft was specified. Each conductor, weighing 21¼ tons, was delivered to the West Thurrock site on drums nearly 13 ft dia.

High-tensile Steel Towers

The crossing towers each weigh 436 tons and are constructed mainly from high-tensile rolled steel sections. They are 100 ft wide at the base and 10 ft at the top. Several unusual features have been incorporated by the designers, Messrs Blaw Knox. A cruciform arrangement has been used for each main leg, and permanent working platforms are provided to facilitate maintenance and which also played a vital part in conductor erection. These maintenance crossarms overhang the conductor crossarms at the tops of the towers by 10 ft.

For raising equipment and for maintenance purposes there are central 15 ft square shafts in the towers which carry stairways to the 375 ft level. Permanent winches are provided at this level and also at 559 ft to raise and lower components.

Construction work on the towers began with the erection of a 125 ft central column and on this was mounted an

Fig. 3. Diagram of the West Thurrock to Swanscombe 400 kV crossing of the Thames which is now nearing completion

80 ft luffing rig. This enabled the first 62½ ft of tower panelling to be erected. The rig was then raised for the erection of the second panel and the procedure repeated to the 375 ft level. The derrick was then "floated" on steel wires secured to corner legs of the tower for the remainder of the construction. An additional derrick was used for erecting the top maintenance crossarms and, when it was completed, this crossarm was used for hauling up the suspension insulator crossarm assemblies.

The two anchor towers are 145 ft high and weigh 99 tons. They present a vertical face to the main towers and have a sloping rear aspect. Working platforms are also provided on these towers and auxiliary crossarms carry the jumper connections from the crossing spans to the connecting transmission lines.

Conductor Stringing

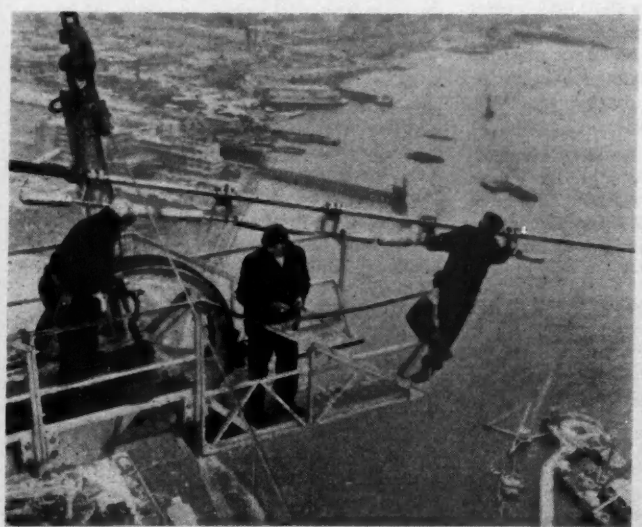
For conductor stringing, a 1½ in. dia track rope and two $\frac{9}{16}$ in. dia haulage ropes were first laid across the river from a barge and then, with the river closed to traffic for four hours, they were hauled to the tops of the towers. The track rope was tensioned and the haulage ropes attached to winches. Vertical carriers, 10 ft long, were suspended, which could run along the track rope and which had rubber-covered bobbins at their lower ends for carrying the conductor. These suspenders were then pulled over the river along the track rope by the haulage ropes. At 80 ft intervals, further suspenders were added to carry the cable. At each tower the suspenders had to be removed and refitted on the other side. At the top of each tower the conductor was carried over a cradle consisting of two 5 ft dia rubber-covered sheaves.

Tensioning

When the end of a conductor reached the far anchor tower, tension was applied at both ends and this lifted it clear of the suspenders. The cradle on each crossing tower was then used to lower the conductor. At the anchor towers, bridled tackles were used to lower it to its final position. The cable is retained at each anchor tower by tension insulators weighing 3¼ tons and 24½ ft overall. Each set consists of eight strings of 20 by 12¾ in. dia porcelain units. With the dead ends anchored, armour rods were fitted to each conductor, which was then attached to the suspension insulators for the crossing towers. These each comprised six strings of 20 by 14 in. dia porcelain, 21½ ft overall length. The tensions involved were between 30 tons/conductor and 35 tons/conductor and the conductors were erected in the order: bottom, middle, top. The time for stringing the conductors was brought down to less than one day.

Contractors

The main contractor was BICC. The towers were designed by Blaw Knox and built by Painter Bros. and Horseley Bridge and Thomas Piggot. Consultants for the foundations were Sir Alexander Gibb and Ptnrs, and they were built by Holloway Bros. The insulators were manufactured by Bullers.



▲ *Fig. 4. High above the Thames, vibration dampers are attached to the conductor at the north tower*

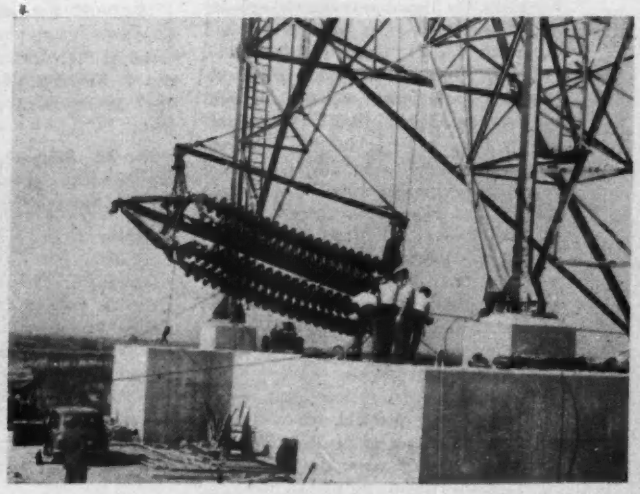
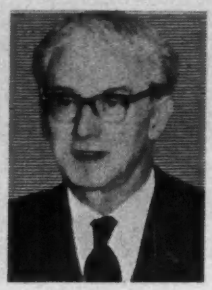


Fig. 5. Tension insulator assembly ready for lifting. The assembly comprises eight strings of 20 by 12¾ in. dia porcelain units ▶

Personalities *in the industry*

Mr A. Haddock



Mr C. Booth

Mr H. W. Thompson

Mr W. F. Cassidy

Mr J. O. Sewell

Mr H. Chisholm, B.A., A.C.A., F.B.I.M., has been appointed chairman of Ada (Halifax) Ltd., which is now controlled by Philips. He succeeds **Lt.-Col. W. D. Gibbs,** who has relinquished the position in view of the increasing weight of his other business commitments. Mr Chisholm, who joined the Ada board of directors a few months ago, has been joint managing director of A. C. Cossor Ltd., a director of the Sterling Cable Co., Best Products Ltd., and other companies.

Manager of the No. 3 (Sheffield) sub-area of the Yorkshire Electricity Board, **Mr A. Haddock,** B.SC., M.I.E.E., is to be chief commercial officer of the Board as from 1 Jan. next. He will succeed **Mr A. Haselhurst,** A.A.C.C.A., A.C.W.A., who is to retire on 31 Dec. after 35 years in the electricity supply industry, almost 14 of which have been as chief commercial officer of the YEB. In addition, **Mr C. Booth,** M.I.E.E., manager of the No. 2 sub-area for the past nine years, is to retire on 31 Dec. To fill these vacancies and that created by the recent death of Mr D. R. Williams (manager of No. 7 sub-area), the Board will shortly appoint new managers for the Nos. 2, 3 and 7 sub-areas. (* ESH, pages 141, 143, 144, 147.) Mr Haddock succeeded Mr J. R. Struthers as manager of the Sheffield sub-area in April, 1949, having previously been engineer in that sub-area. He studied at Leeds University and gained early training with W. T. Flather and Co. Ltd. He was with the Yorkshire Electric Power Co. from 1927 until joining the Sheffield Corporation undertaking in 1935 as assistant mains engineer, and subsequent promotions included deputy distribution engineer (1937), distribution engineer (1939), and to distribution engineer and sales manager from 1945. Mr Haddock is also a past chairman of the IEE Sheffield sub-centre. Mr Booth was manager of the Board's No. 5 sub-area for four years until going to Huddersfield in 1952. Prior to vesting day he had been borough electrical engineer and manager at Dewsbury for nearly two years, after a period as chief engineer and manager of the Spenborough Electricity Department. He received technical education at Dewsbury Technical College, Leeds University and Royal Naval engineering establishments, and was deputy chief at Spenborough before assuming the major post. He has also served on CEB area consultative committees and EDA area committees, and was for a time Yorkshire local centre representative to the AMEE executive committee.

Mr H. W. Thompson has relinquished the position of commercial manager of the Major Appliances Group of Philips Electrical Ltd., a position he has held since last March. Earlier he had been marketing manager with AEI-Hotpoint Ltd. Mr Thompson's successor is **Mr W. F. Cassidy,** who has been manager of Philips' South East Region since January, 1959, and earlier, was Midlands Region manager.

Mr W. H. Beswick has been appointed assistant superintendent of the Meter Dept. at the Motherwell works of Associated Electrical Industries Ltd. Since 1957 he has been development engineer there.

Mr M. Biddulph, technical manager, has now been appointed technical director of Universal Metal Products Ltd.

Senior research lighting engineer of the GEC, **Mr J. M. Waldram,** B.SC., A.M.I.E.E., F.INST.P., F.I.E.S., is now on a six-week visit to the USA and Canada during which he is to present a paper on "Vision in Streets and Motorways" to the National Technical Conference of the American IES, and a paper on "Lighting and Architecture" to Toronto School of Architecture, in addition to addressing other technical audiences. He will also visit the Outdoor Lighting Laboratory of the GE at Hendersonville and various other organisations concerned with illumination.

Chairman and managing director of GEC's new subsidiary, GEC (Lighting and Equipment) Holdings Ltd.—to which we refer on page 352—is **Mr J. O. Sewell,** who served the Yale and Towne Manufacturing Co. in North America and Europe in various management posts and was its managing director in the UK and a vice-president of its international operations. Mr Sewell, who read commerce and finance at Queen's University, Kingston, Ontario, is a Canadian certified public accountant.

From Honeywell Controls Ltd. we hear that **Mr L. Dilger,** B.SC., A.M.I.E.E., has been appointed technical sales manager, Electronic Data Processing Division. Three other new appointments in that Division are: **Mr M. Hare** as manager of applied programming, **Mr J. Kenny** as manager of the EDP Centre, and **Mr H. La Costa** as commercial sales manager. Mr Dilger was previously research manager, Nash and Thompson Ltd. and group leader of the Computer Department, S. Smith and Sons. Mr Hare had been head programmer, Glaxo Laboratories Ltd. Mr Kenny previously handled ICT's Continental computer interests, and Mr La Costa has been ICT's manager in north-east England.

Mr F. Shutt, C.A., has been appointed financial comptroller to Hawker-Siddeley Industries Ltd. as from 4 Sept. He joined the Hawker-Siddeley group in 1952 and two years later moved to Bristol Siddeley Engines, in Coventry, as assistant chief accountant, subsequently becoming chief accountant, assistant secretary and, in 1959, secretary to the company.

**Denotes revision to the "Electricity Supply Handbook, 1961."*

Secretary of the Birmingham area of the Midlands Electricity Board since 1948, **Mr A. Webb,** F.C.I.S., is to retire at the end of this month, after over 40 years' service in the electricity supply industry (*ESH, page 125). After studying at Hanley Technical School he was with the Stoke-on-Trent Corporation Electricity Dept. from 1920 to 1928, when he joined the Watford Corporation undertaking as commercial assistant. In 1936 he was appointed assistant secretary to the Birmingham Electric Supply Dept., a position he held till 1948.

Rear-Admiral Sir Philip Clarke has had to retire from the board of Ether Langham Thompson Ltd., on doctor's orders. His place on the board has been filled by the appointment of **Sir Charles Key.**

Formerly director of research to Tube Investments Ltd., **Dr T. P. Hughes** has joined the BB Chemical Co. Ltd. as joint assistant managing director.

Associated Electrical Industries Ltd. announce that **Mr A. C. Ehrenberg,** DIP.ENG., A.M.I.E.E., has now been appointed manager and chief engineer of the Switchgear Testing Co. Ltd., at Trafford Park, and **Mr A. V. Sykes** becomes secretary of that concern while retaining duties as chief clerk, Secretary's Dept., AEI (Manchester) Ltd. These appointments follow the retirement of **Mr V. A. Brown** as manager and secretary of the Testing Co. Presentations were recently made to Mr Brown on behalf of the staff and directors. Mr Ehrenberg joined Metropolitan-Vickers Electrical Co. Ltd. in 1923, and after two years on a college apprenticeship course spent 18 months on outside erection and 12 months in the Turbo-Generator Drawing Office. He then transferred to Switchgear Dept. as a special trainee, on a course which included 18 months in the HV Laboratory of the Research Dept. As a junior engineer he became interested in short-circuit testing, and his work led to many spells of testing at the AEG test plant in Berlin. In 1932 he spent three months in Russia as a consultant on switchgear. Upon his return to Manchester he became closely connected with the building of the AEI test plant which, in July, 1934, commenced operation as the Switchgear Testing Co. Ltd. Mr Ehrenberg was appointed engineer-in-charge, but with the expansion of the company this position was changed to that of chief engineer. Mr Brown studied at Manchester University and received early training with the British Westinghouse Co. After war service he joined Ferguson Pailin Ltd. in 1921, becoming chief engineer of the Research Dept. there in 1923, and holding that post until 1934 when he was appointed manager of the Switchgear Testing Co. He combined that office with that of secretary from 1946 onward. Mr Brown served on numerous ERA committees concerned with switchgear, and has been a member of the Management and Technical Committee of ASTA since its incorporation in 1938, being chairman of the Technical Committee since 1946. He has also served on BSI committees.

District manager at Uttoxeter to the East Midlands Electricity Board, **Mr A. McGregor,** ASSOCIATE I.E.E., was the recipient of a presentation on his retirement last month. As from 1 Sept. the district has become double headed, with **Mr H. C. Fox** as engineer, and **Mr E. G. Savage** newly appointed as district commercial engineer (*ESH, page 117).

Sir John Cockcroft has been elected president of the British Association for the Advancement of Science for the 1961-62 session.

Mr C. E. G. Nye, M.C., has retired from the board of the George Cohen 600 Group Ltd., with whom he has served for 40 years.

Previously a director of Quasi-Arc Ltd., **Mr Robert Butler** has been appointed managing director of Eutectic Welding Alloys Co., part of the Eutectic/Castolin International Group.

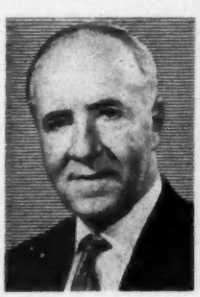
In consequence of a reorganisation of area representation by Wild-Barfield Electric Furnaces Ltd., three new appointments have been made. **Mr C. A. McNeill,** formerly with GWB Furnaces Ltd., becomes a sales engineer in the Birmingham and East Midlands area; **Mr T. M. Morgan** takes over Wild-Barfield representation in South Wales and Monmouthshire in addition to that of GWB Furnaces Ltd., whom he has represented for a number of years, and **Mr A. V. Skelsey** takes over the newly formed West Midlands territory.

Administration and services manager, Research and Development Laboratories, DCL plastics group, **Mr L. M. Read,** A.R.C.S., A.M.I.CHEM.E., F.P.I., has been elected chairman of the Council of the Plastics Institute. The new vice-chairman is **Mr M. Jones,** B.SC., F.I.R.I., F.P.I., development director, Plastics Division of ICI.

From the BBC we hear that **Mr H. C. J. Tarner,** A.M.I.E.E., A.M.BRIT.I.R.E., has been appointed engineer-in-charge Television (News) in succession to **Mr A. D. D. Strathairn,** who has retired. Mr Tarner, who has been assistant engineer-in-charge Television (News) since 1959, joined the BBC in 1944.

Mr Hector D. Walker has retired from the board of Constructors John Brown Ltd. as from 1 Sept. He will continue to be associated with the company as a consultant and as a director of the CJB subsidiary companies—Automatic Control Engineering Ltd. and Corrosion and Welding Ltd.

The new works manager of the Trafford Park works of AEI (Manchester) Ltd. is **Mr A. Paterson,** B.SC., A.R.T.C.(GLASGOW), M.I.P.E., with **Mr A. J. R. Veale,** ASSOCIATE M.C.T., A.M.I.MECH.E., M.I.P.E., as assistant works manager with special responsibilities for the Manufacturing Services Dept. Mr Paterson joined Metropolitan-Vickers' Motor Engineering Dept. in 1930 after taking a college apprenticeship course. Five years later he turned to motor manufacture, being superintendent's engineer until 1942, and thereafter assistant superintendent, Motor Dept. He was promoted to superintendent of that department in 1945, and in 1952 also undertook the additional responsibility of assistant works manager of the M-V Mosley Rd and Leonard works. He became assistant works manager in 1954. Mr Veale joined Metropolitan-Vickers as a school apprentice and after a period in the Transmitter Dept. joined Control Dept.



Mr A. C. Ehrenberg

Mr A. V. Sykes

Mr V. A. Brown

Mr A. Paterson

Mr A. J. R. Veale

in 1944 as a manufacturing engineer. He became assistant superintendent of the Control and Radio Dept. in 1949, assistant superintendent of the Radio Dept. in 1953, assistant superintendent Process and Rate Dept. in 1954, with promotion to superintendent shortly afterwards. Since 1959 he has been manager of the Manufacturing Services Dept.

Works engineer of the Fraser and Chalmers engineering works of the GEC, Erith, since 1941, **Mr F. L. Griffiths,** M.INST.F., M.I.PLANT.E., has been promoted to constructional engineer for the whole of the GEC organisation. He succeeds **Mr R. Bennett,** who retired at the end of August. Mr Griffiths is a former Fraser and Chalmers apprentice, but left the company in 1929 to gain other experience, and returned in 1941 to take up the position of works engineer. In addition to his duties at Erith, Mr Griffiths has been consultant on boiler plant and heating to all works in the GEC organisation. His successor at Erith is **Mr H. B. Pellatt,** who also joined Fraser and Chalmers as a pupil apprentice in 1940. After completing his apprenticeship he served for three years in the drawing office of the Works Engineer's Department. Following this, Mr Pellatt was made responsible for the maintenance and servicing of the works engineering plant, including the turbine test equipment. He was also largely responsible for maintaining all the works services, including heating and ventilation.

Four new appointments are announced by the Power Plant Division of the General Electric Co. Ltd., at Erith, with responsibility to the Divisional Manager, **Mr D. M. Smith,** M.I.E.E. The former sales manager, **Mr F. L. Tombs,** A.M.I.E.E., has been appointed manager, engineering services, with responsibilities for Sales, Tendering, Contracts and Operational Services Departments and for site resident engineers. After training at GEC, Witton, Mr Tombs joined Birmingham Corporation Electricity Supply Department in 1946 and left the CEGB in 1954 to join the GEC Power Plant Division as operational services manager. **Dr D. Kalderon,** PH.D., A.M.I.MECH.E., who was previously chief development engineer, now becomes deputy chief engineer. He joined GEC in 1955 as turbine design engineer, in which capacity he was responsible, through Mr J. M. Mitchell, the chief engineer, for much of the large reheat machine development. **Mr W. G. Rhodes,** M.I.MAR.E., A.M.INST.F., who now becomes manager, home sales, joined GEC in 1959 and has been responsible for comprehensive power station contracts. Earlier he was project engineer in the Engineering Division of the Reed Paper group, following experience as boiler house superintendent at Brunswick Wharf power station and with the Yorkshire Electric Power Co. **Mr D. C. Thorpe,** B.A.(HONS.) is now manager, overseas sales. He obtained his degree at Corpus Christi, Oxford, and joined GEC in 1956 as a post-graduate apprentice, subsequently leaving to take up a post as sales engineer with Westinghouse Electric International Co., New York. He rejoined GEC in 1960 as an overseas sales engineer.

Mr F. Simpson has been appointed director and general manager of Kenwood Manufacturing (Australia) Pty. Ltd., a subsidiary of the Kenwood group. Since May, 1954, he has been general works manager of the Australian company, and was previously production manager of the group's Woking factory. Since that time Kenwood have built a factory in Adelaide which is now in full production on the Kenwood Chef mixer.

The Ministry of Aviation announces that **Dr G. G. Macfarlane,** B.SC., A.M.I.E.E., DR.ING., at present deputy director of the National Physical Laboratory of the Department of Scientific and Industrial Research, is being appointed director of the Royal Radar Establishment at Malvern. Dr Macfarlane will take up his new duties in the early part of 1962.

Mr R. S. Seagrave, B.SC.(ENG.), is the area manager of the newly opened northern area design office of Automatic Control Engineering Ltd., at 15 Bloom St, Manchester. Mr Seagrave has been with ACE Ltd. for several years and has been responsible for the engineering of many automatic system projects. Earlier he was with George Kent Ltd.

Previously with Troughton and Young, **Mr F. Pearce** has joined Mortimer Gall and Co. Ltd. as senior contracts engineer.

Mr C. T. Melling, C.B.E., M.SC.(TECH.), M.I.E.E., M.I.MECH.E., M.INST.F., F.B.I.M., deputy chairman of the Electricity Council, is one of five new members of the Clean Air Council.

Recently retired as electric furnace melting shop manager with Samuel Fox and Co. Ltd., **Mr F. T. Bagnall** has made his services available to Birlec-Efco (Melting) Ltd., in the design and operation of their equipment.

As president of the Chartered Institute of Secretaries, **Mr S. M. Rix,** F.C.I.S., A.C.A., deputy chairman of the Southern Electricity Board, flew to Montreal on Monday on a two-week tour of the Institute's branches in Canada.

District engineer at Yeovil to the Southern Electricity Board since July, 1949, **Mr V. C. Botham,** A.M.I.E.E., has retired. He began his career with the St. George's Engineering Works, Brighton, in 1911, and in 1919 joined the Cookham and District Electricity Corporation, where he held the posts of assistant engineer and manager. In 1928 he became manager of the Ruthin Electric Supply Co., and seven years later, when the Ruthin Corporation took over the undertaking, he was borough electrical engineer for a time. In December, 1937, he joined the Wessex Electricity Co. at Yeovil, where he became mains engineer, holding that post until July, 1949.

Mr A. Newnes has been appointed Midland area sales manager at the new sales office of Hellermann Ltd., at 380 Boldmere Rd, Sutton Coldfield, which was opened on Monday last.

Mr R. E. Mann, who joined the Transformer Sales Department staff of the AEI Rugby Works in 1932, and who has latterly been specialising in large transformers for the steel industry, has retired.

Mr Richard P. E. Tabb has been appointed deputy director of engineering of the English Electric Co. Ltd. He will be mainly concerned with the company's technical development programmes. He

Mr F. L. Tombs

Dr D. Kalderon

Mr W. G. Rhodes

Mr D. C. Thorpe

Dr G. G. Macfarlane

joined EE Co. as a graduate apprentice in 1929, and he subsequently gained experience in the AC Machine Design Department at Stafford—specialising in induction regulators. He then went to the US as the company's liaison engineer with the Westinghouse Electric Corporation, returning to Stafford in 1937 as rolling mill drive engineer. In 1944 he became assistant to the company's chief engineer, with responsibility for the co-ordination of development work. He became deputy chief engineer of the newly formed Guided Weapons Division in 1952, and two years later was promoted to assistant director of engineering at London headquarters. He is a BEAMA representative on the BSI Electrical Industry Standards Committee, and a member of the CIGRE British National Committee.

Divisional manager of the Capacitors and Resistors Division of the Plessey Co., at Swindon, **Brig J. D. Haigh,** O.B.E., M.A., M.I.E.E., has been appointed general divisional manager of a group of divisions including the Wiring and Connectors Division, the Capacitors and Resistors Division and Preformations Ltd. Brig. Haigh joined Plessey's in 1958 after being director of electronic research and development, Ministry of Supply, for four years.

The new district engineer at the Central district, No. 1 sub-area of the North Western Electricity Board, is **Mr A. J. Dumville,** who has been first assistant district engineer there since 1959 (*ESH, page 156).

On Monday next, **Mr J. B. Flynn** takes up an appointment on the sales staff of Brook Motors Ltd., Plymouth office. He joined the company in 1951 as an apprentice, and the following year won its "Apprentice of the Year" award.

Manager—export sales, to the M-O Valve Co. Ltd., **Mr C. H. Russell,** has now been appointed product planning adviser to the management of the company. He will also retain his interest in sales. His new appointment involves guidance of policy with respect to new products by the provision of all the information and statistics necessary to anticipate new markets for valves and c.r.t's. Mr Russell joined the parent company in 1947, and, until he became manager, M-O Valve export sales, in December, 1960, was engaged on valve research work at the Wembley Research Laboratories, now the Hirst Research Centre, of the GEC.

The Sofono Electrical Division of Federated Foundries Ltd. have appointed **Mr R. V. Fisk** and **Mr W. R. Lonsdale** as new area sales representatives. Mr Fisk, previously with S. N. Bridges Ltd., will cover south western counties, and Mr Lonsdale, formerly with Simplex Electric Ltd., will operate in the north of England.

On being appointed a special director and deputy general manager, Barrow works of Vickers-Armstrongs (Engineers) Ltd., **Mr P. D. Scott Maxwell,** D.S.C., M.I.MECH.E., relinquishes his position as managing director of Cooke, Troughton and Simms Ltd., but retains his seat on the board. He also relinquishes the posts of chairman and managing director of C. Baker Instruments Ltd., director of Casella (Electronics) Ltd., director of Cooke, Troughton and Simms South Africa (Pty.) Ltd., and president and director of Cooke, Troughton and Simms Inc. **Mr H. Wright,** A.C.I.S., has been appointed managing director of Cooke, Troughton and Simms Ltd., and becomes a director of the South African concern and president of the USA subsidiary. In addition, **Mr A. J. Munro,** B.SC.(ENG.), A.M.I.MECH.E., A.M.I.PROD.E., becomes engineering director, responsible for the technical departments in addition to production (he is also a director of the USA concern), **Mr E. Cussans,** M.I.PROD.E., is appointed works manager and **Mr S. S. L. Marshall,** A.C.I.S., is commercial manager in addition to his existing appointment as secretary.

OBITUARY

Mr P. R. Jenkins, a director of Copeland and Jenkins (Holdings) Ltd., died on 1 Sept.

NEW LITERATURE

Current Engineering Practice:

Vol. 2, No. 12 and Vol. 3, Nos. 1 and 2. Special Number covering Golden Jubilee Symposium on High-voltage Power Transmission and Protection Against Surges.

THIS special issue of the Indian monthly journal, *Current Engineering Practice,* is devoted entirely to publication of papers presented at the Golden Jubilee Symposium organised by the Indian Institute of Science, Bangalore, in January, 1960. Following addresses given by the chairman of India's Central Water and Power Commission and the president of the Institute, 30 papers were presented at the symposium, 25 appearing in full, the remainder being in summary form. Subject matter covers a wide field within the scope of high-voltage transmission and protection. Choosing at random from only three of many papers of interest to power supply engineers, examples of topics include: rural distribution systems employing single-wire and earth return, the effect of humidity on high-voltage insulator flashover and lightning protection of transmission lines under tropical conditions. The issue publishes in addition, abstracts of papers presented and records the discussions. Published by Current Technical Literature Co. Private Ltd., Bombay, 202 pages, 8¼ in. by 11 in. Price Rs15.

Active Networks and Feedback Systems

edited by Jerome Fox

IN April of last year the Polytechnic Institute of Brooklyn sponsored a three-day symposium at which 32 papers on feedback systems and active networks were read and discussed. All but six of these were of American origin, England, France and Germany contributing a single paper with two from Japan. The papers, without discussions, are here bound and presented as a record of the occasion. The technical content will be of considerable value to all investigators in microwave fields. Published by Interscience Publishers Inc., 88-90 Chancery La, W.C.2, 658 pages, 8¼ in. by 5¾ in. Price 60s.

A Guide to Technical Writing

by C. Baker, A.R.AE.S.

THE title of this book is rather misleading for it is concerned rather more with presenting technical information than with technical writing as such. Four pages consider the qualities required of a technical author and ten are devoted to English grammar and composition. The main sections of the book outline the variety of technical publications, consider how they may be illustrated and offer some thoughts on communicating ideas to the reader. It will prove a useful guide to someone unaquainted with technical literature but there is little which those engaged in technical writing will find new. Sir Isaac Pitman and Sons, 101 pages, 7¼ in. by 4¼ in., 15s.

Technical Data on Fuel

edited by H. M. Spiers

THIS is the sixth edition of the now standard reference work on fuels compiled by the British Fuel Committee of the World Power Conference. The last edition first appeared 11 years ago, though there have been two reprints—in 1952 and 1955. The page size has been enlarged and the text and tables reset in more legible type; moreover, the contents have been revised and expanded to include atomic and nuclear fuels, viscosity blending of oils, flow in fluidised systems and properties of the latest chlorinated fluoromethane refrigerants. Other sections have been brought up to date, with complete rewriting in certain cases. Nothing can be added to what has already been said; it is, and will remain, the indispensable reference work for fuel technologists, engineers and scientists throughout the world. Published by British National Committee, World Power Conference, 201 Grand Buildings, London, W.C.2. 322 pages and index, 11 in. by 8¼ in. Price £3. Sixth edition.

new products and appliances

Lamp claimed to combat glare

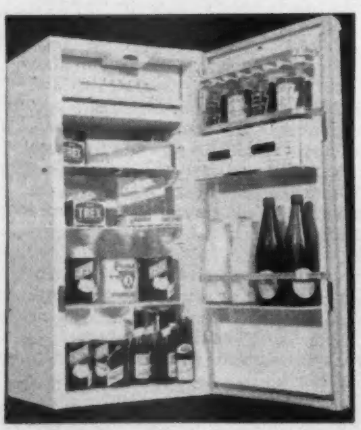
CLAIMED to reduce surface glare is the new mushroom-shaped lamp from Osram, "Filta-Lite," which is being launched this month. Manufacturers use a process involving coating the inside of the globe with titanium dioxide on a pearlescent surface. This, they claim, gives even distribution and a reduction of surface glare by nearly half the normal surface brightness of a mushroom lamp. These lamps are available from 40 W to 150 W ratings. *Osram Lamp Division, GEC Ltd, East La, Wembley, Middx.*

Panel heaters

UNITY HEATING have introduced a range of panel heaters in standard lengths from 2 ft to 6 ft with inclusive intermediate lengths. They are rated at 120 W/ft and 180 W/ft, and the 2 ft model, rated at 60 W/ft, retails at £4 10s. In our last issue we inadvertently stated that these panels were 2 ft 6 in. long. These panels are 7½ in. wide and ventilated at regular intervals by grilles, and an unventilated model is also being manufactured. *Unity Heating Ltd., Chilworth Manor, Southampton, Hants.*

Improved welding electrode for m.s.

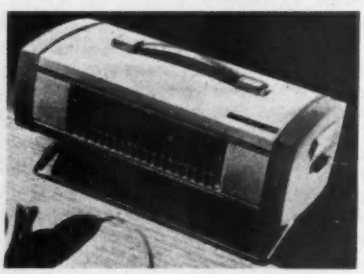
FOR welding all thicknesses of mild steel sheet from 14 s.w.g. upwards, an improved version of "Diadem Emerald" electrode has been introduced. Complying with relevant BSS, principal features claimed for the new electrode are production of fillet welds with mitre profile, self-releasing slag and a wide current range with stable arc. Mechanical properties of deposited metal include an u.t.s. of 24 to 28 tons/sq in. with an elongation of 26% to 32%. Available in seven sizes from 12 gauge to $\frac{1}{8}$ in. dia, a typical deposition time is 72 sec/ft, quoted for a six-gauge electrode. *Cooper and Turner Ltd., Vulcan Rd, Sheffield 9.*



Due for distribution early next year is the A. J. Flatley Ltd. latest venture into the domestic market, a 3 cu ft compressor type refrigerator. Our photograph shows a prototype of the model which is to be produced in the company's Irish factory and sold at 27 gn

Another fan heater from Engelhard

FOLLOWING their "Turboflo" 3 kW tangential fan heater, Engelhard have introduced a 2 kW "Minor" version with twin-speed control. The body can be tilted to any desired position and a



positive locking system keeps it steady. Measuring 14½ in. long overall by 5½ in. high and 6½ in. deep, this unit sells at £11 1s 9d, including tax. *Engelhard Hanovia Lamps Ltd., Bath Rd, Slough.*

Addition to "Crompack" range

SOON after the introduction of their single lamp "Crompack" fitting, Crompton Parkinson have introduced a two-lamp version incorporating all the features of its predecessors. Available in 8 ft, 5 ft and 4 ft lengths, this lighting fitting uses Crompton warm-white, high light output tubes. It is adaptable and with the addition of reflector and diffuser assemblies could find wide application for commercial and industrial purposes. Prices complete with tubes range from £7 6s 2d to £20 12s. *Crompton Parkinson Ltd., Aldwych, W.C.2.*

Batch counter

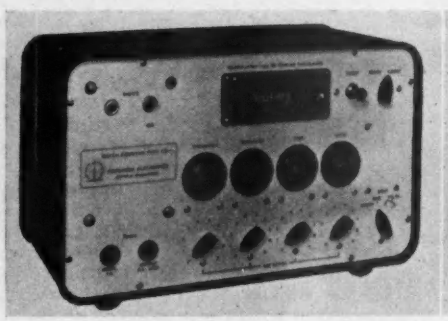
A VERSATILE batch counter, designed and built by Ferguson Electronics, has a counting speed of 4,000 per sec and a batching rate of one per sec. The unit is capable of counting up to 10,000 items in one batch and up to one million batches but, if the two are used in series, a total batch count of 10,000 million is possible. That is to say, at the full counting speed and without cessation it would take one month to reach the ultimate capacity of the unit.

Dekatrons are used for batching count with an electromechanical display for the number of batches. Batch sizes can easily be set by selectors on the front panel. Designed for production lines where output rates are high, the instrument weights only 20 lb and is housed in a steel case 15½ in. by 10 in. by 10 in. It is offered at an extremely attractive price. *Industrial Control Systems Div., Thorn Electrical Industries Ltd., Enfield, Middx.*

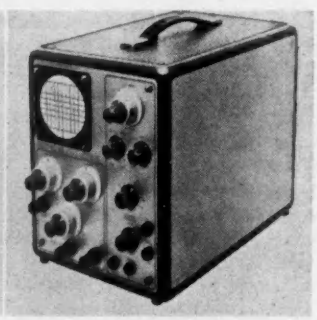
G.P. oscilloscope

A LOW priced, versatile oscilloscope for general purpose applications is the new Model 381 from Dartronic. With a sensitivity of 100 mv/r.m.s./cm and nine switch positions from 0·1 V to 50 V r.m.s. it has many applications in industry, research, education and radio/television servicing. The time base is a pentode valve used in a Miller circuit and the c.r.t. is a Etel type 3AFP31, giving a 3 in. display. The trace may be expanded to at least seven screen dia.

The instrument operates from a.c., 200/250 V, 50/100 c/s mains and the power consumption is 95 W. Instruments for 110 V and other non-standard supplies can be made to order. The list price of the standard model is £36. *Dartronic Ltd., 3-7 Windmill La, London E.15.*



An electronic batch counter by Ferguson Electronics with a capacity of 10,000 million and a counting speed of 4,000 per sec



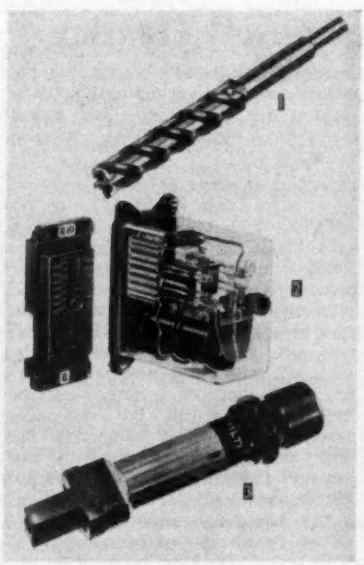
A 3 in. display general purpose oscilloscope at £36 by Dartronic Ltd. Power consumption is 95 W

Concrete drill

AN entirely new design of concrete drill which will be of interest to the electrician and installation engineer is just announced. It is the JPS "Concrete Master," and is in three parts: a cutting head comprising a tubular body grooved on the exterior to throw out the dust with three brazed-in tungsten carbide cutting teeth, a drive shank incorporating a tungsten carbide starter tip and a specially toughened drive pin. In use, the shank is inserted in the chuck of the rotary drill and a drive pin inserted in the hole furthermost from the tip. When the cutting head is placed on the shank, the starter tip projects through the end of the cutting head and is used to start the hole. When the cutting head has cut its way a short distance into the concrete, the tool is withdrawn and the drive pin inserted in the second hole. The starter tip is then withdrawn into the body of the cutting head which completes the hole. The tool is available in nine diameters and three lengths, with special sizes for Rawbolts and holes over 1½ in. *Perkins and Smith Ltd., Braunston, Rugby.*

Cartridge Tool

ANOTHER useful tool for installation engineers is of the detonated type fired by a hammer blow through a captive plunger. The "drill" is the actual stud or bolt to be inserted in the brick or concrete. It is, in fact, a redesign of the well-known Hilti DX 1001 cartridge-assisted tool to improve maintenance and eliminate a few weaknesses which have been disclosed by the earlier tool in service. Price remains unchanged. *Ucan Development Ltd., Ucan Hse, Portsmouth Rd, Esher, Surrey.*



1. The JPS "Concrete Master" drill. 2. The D.2600/F "fleeting contact" relay. 3. The redesigned Hilti DX 1001 cartridge-assisted tool

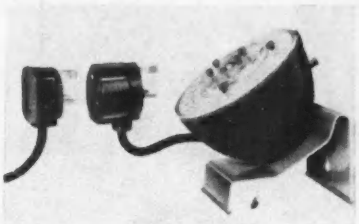
New plug-in relay

A NEW relay of the "fleeting contact" type has been developed by Clifford and Snell on the basis of their standard D.2600 series plug-in relay. In this a small subsidiary relay is incorporated and can be so connected that it operates for about one-tenth of a second either when the main relay is energised or released or both. Fleeting contact relays have a number of applications such as in alarm circuits when a fleeting contact is required to set off an alarm until manually cancelled after the cause of the alarm has been investigated. They are also used in many automatic control circuits.

The new relay, Type D.2600/F, incorporates "Mycalex" contact insulation and a new type of base and socket. *D. Robinson Ltd., 5-7 Church Rd, Richmond, Surrey.*

Domestic time switch from Sangamo

SANGAMO WESTON'S first venture into the domestic time switch field is introduced this month with a model which features simplicity of setting with attractive design. "On" and "off" operations are controlled by pins set into a graduated dial marked in half-hour periods through 24 hr. Three pins control the "on" sequences and three the "off." Minimum period between consecutive sequences is 30 min and there must be a lapse of 1¾ hr between like operations. The time switch has an a.c. synchronous mechanism and is supplied with a three-pin plug adaptor, which can be rated at either 15 A or 13 A. This model is loaded to 3 kW and sells at £5 19s 6d. *Sangamo Weston Ltd., Enfield, Middx.*



Simple to operate, Sangamo Weston's domestic time switch is their first venture into this field

NEW RANGE FILLS THE GAP

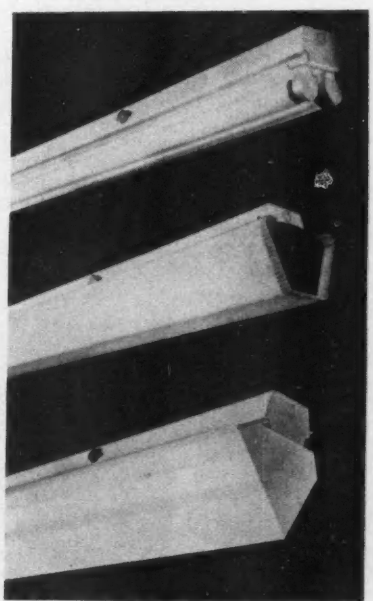
DESIGNED to fill the gap between Ekco-Ensign's de luxe "Essex" range and the more popular "Super Slim" packaged fittings are a new series of fluorescent lighting units called "Durham," which were introduced on Monday. With the introduction of these fittings, the makers have been able to produce a medium-sized range suitable for industrial and commercial purposes. Fittings in the range are based on single- or twin-lamp spines with built-in control gear, and it is possible to build up a variety of units on these.

Spring Mounting

Spring mounting is a feature of the holders and fittings are available in 4 ft, 5 ft and 8 ft lengths, with either "Quickstart" or "Switchstart" controls. Bi-pin lampholders used in the range completely enclose the lamp cap, which has the feature of being attached to the fitting by flat strip springs, so the whole holder is sprung. This is said to assist replacement of fluorescent tubes but still provide adequate pressure at the contacts. Control gear starter switches are fitted at the side of battens and fixed-voltage chokes are standard to all units in this series.

Flexibility and interchangeability are features of this range. Units can be rapidly converted from plain batten fittings by the addition of totally enclosed reeded opal diffusers or by reflectors. This gives a permutation of 12 fittings in the range. Cover plates, reflectors and diffuser suspension plates are easily fitted by means of screws and keyhole slots.

Cost of fittings with "Switchstart" controls range from £4 for a 40 W, 4 ft batten fitting with single tube to £19 2s 2d for a 125 W, 8 ft totally enclosed diffuser fitting with twin fluorescent tubes. On an average "Quickstart" circuits are slightly more expensive, costing 10s more per tubeway for 40 W, 4 ft and 80 W, 5 ft fittings and £1 10s extra per tubeway for 125 W, 8 ft fittings. *Ekco-Ensign Electric Ltd., 45 Essex St, Strand, W.C.2.*



Above: a twin tube batten. Centre: fitting with reeded opal diffuser. Below: angled reflector directs light

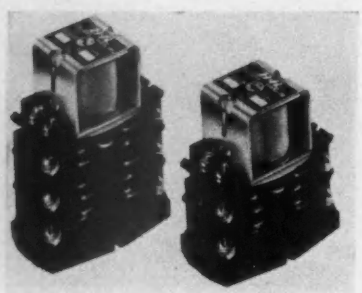
Infra Heat's table-top grill which should become popular in the catering and licensed trades. It has top and bottom elements

Table-top grill for hotels

HOTELIERS and restaurateurs will welcome the advent of a table-top grilling unit recently launched by Infra Heat. Called "Minigrill," this appliance, a multi-purpose contact grill weighing less than 7 lb, is only 6¼ in. dia. The grill can conveniently be placed anywhere on a bar counter and has the advantage of having both upper and lower elements, so it can be used either open or closed. Maximum temperature obtained is about 450°F and the "Minigrill" is loaded to 600 W. It is claimed to be versatile and to toast a sandwich in one minute. Cost: £5 12s 6d. *Infra Heat Co. Ltd., 22 Clifton Rd, W.9.*

Industrial relay/contactor

A NEW industrial type relay which, it is claimed, also has applications as a contactor unit, has been added to the existing B and R range. Designated the "Q51," the device is rated at 440 V 50 c/s and is available with either two, or three three-phase switch banks. Contacts are rated at 10 A inductive and relay operating times are said to be within 10 millisec to 30 millisec for both pull-in and drop-out action. Relay coils, which can be supplied for various operating voltages, are readily interchangeable. Typical applications quoted for the unit include sequential control of machine tools and direct-on-line starting three-phase motors. *B and R Relays Ltd., Temple Fields, Harlow, Essex.*



Two industrial type relays which have been added to the B and R range

Lamps need no diffusers

TWO gas-filled lamps, types "XX" and "X," which obviate the need for diffusers, have been announced by Ascot. These mushroom-shaped lamps, which are to be launched in the autumn, are somewhat larger than conventional globes. Type "XX" measures 8¼ in. long and 5½ in. at its widest point, and type "X," slightly smaller, is 7⅛ in. long and 5 in. wide. Designed for use in factories and commercial premises, the lamps have bayonet fittings and are rated at 150 W and 200 W. They have single-coil filaments and are internally coated with titanium dioxide. Having a guaranteed life of 2,000 hr, these lamps sell at 12s 6d for type "X" and 17s 1d for type "XX." Both prices include purchase tax. *Ascot Lamps and Lighting Ltd., Arcola St, E.8.*

Polystyrene capacitors

COMPETITIVELY priced and extremely small in size, the new range of TMC miniature polystyrene capacitors has been specially designed for transistorised and low voltage circuit applications. Capacitance values are from 0·0005 mf to 0·5 mf with a standard tolerance of ±1%. Sizes range from $\frac{3}{16}$ in. long by $\frac{1}{16}$ in. dia to 1 15/32 in. long by 25/32 in. dia and all are for working voltages of up to 50 V d.c. Insulation resistance is not less than 750,000 megohms with power factor not greater than 0·001 at 1 kc/s.

Although of such small size, the capacitors retain all of the superior characteristics of larger polystyrene capacitors. *Telephone Manufacturing Co. Ltd., Capacitor Div., St. Mary Cray, Orpington, Kent.*

This travelling iron by Pifco has a folding handle and is dual voltage

Compact Travelling Iron

COMPACT in size with a folding handle, the Pifco Travel Iron is designed for use on British and continental voltages. Required voltage is obtained by adjusting a voltage selection switch at the back of the iron. Retailing at £3 4s, including purchase tax and surcharge, the appliance is supplied with a connector and nine feet of flex in a grained plastics case. *Pifco Ltd., Manchester.*

Campaigns

A HEAVY advertising campaign for their new standard-volt shaver is being launched by Sunbeam. This razor in the "Shavemaster" range sells at £10 13s 3d, including tax.

Courtney, Pope too are launching a special campaign to boost their "Brite-Glo" packaged lighting units. One of the gimmicks is a three-dimensional showcard for retailers.

Sunbeam Electric Ltd., East Kilbride, Glasgow.

Courtney, Pope (Electrical) Ltd., Amhurst Pk Wks, N.15.

Accent on "Whole-house" Heating

YET another entry into the field of domestic "whole-house" heating has been announced, this time by Aerialite, who include a form of ventilation. The system which they have designed incorporates a central unit and ducting laid beneath floors to carry air to ground floor rooms but at the same time providing a modicum of heating on the first floor.

Ideal siting for the central unit would be in a cupboard and manufacturers recommend it should be mounted on fibreboard or similar resilient material. There is a range of three units, E20S giving an output of 20,000 B.Th.U. at 6 kW, model E30, giving 30,000 B.Th.U. at 9 kW, and the E30S, giving the same output as the E30, but with a selector switch giving one-third, two-thirds or full output.

Suits existing houses

This system is said to be suitable for existing houses or those in the course of construction and has an air volume of 560 cu ft/min. Hot air is obtained by propelling air with a fan over two- or three-bank open-wire elements. These are claimed to have low heat retention ensuring temperature of the unit is kept to the minimum. The makers also recommend that runs of ducting should be short and as direct as conveniently possible; sharp bends would reduce air flow which is circulated in rooms through outlet registers. These registers can be adjusted to regulate air flow in each room and return grilles remove stale air. A compact control panel incorporates a time switch but it can also be operated manually. Also on the panel is a "hot-off-cold" switch. Available as accessories are a full range of ducting, room thermostats and grilles. For single-phase operation, individual contactors fitted with time delays are used to avoid voltage fluctuation of mains supply. Installation costs for this system in a house during the course of construction is estimated at approximately £150. This figure would be increased by some £20 in existing buildings and the manufacturers say that delivery of the unit varies from six weeks to eight weeks. *Aerialite Ltd., Castle Wks, Stalybridge.*

British Association at Norwich

IMPRESSIONS FROM 123RD ANNUAL MEETING

IN his inaugural address to the British Association for the Advancement of Science, held this year at Norwich, the president, Sir Wilfrid Le Gros Clark, F.R.S., chose as his subject "The Humanity of Man." In a brief review of man's development over the ages he showed how, today, the struggles for political and economic superiority were endangering the civilisation which mankind had laboriously built over the ages. Much of the progress had arisen from the work of the individual and the manner in which individuals had learned to co-operate. But co-operation over the years had led to progressive assimilation of smaller groups into larger groups of complex social structure, with the result that, though the progress of unification as a whole had been to the benefit of the community, the altruistic statements of the individual are today apt to be suppressed by the narrow interests of the group.

The Scientist and Survival

If we are to survive and continue the work of unification for the good of mankind, it is essential that there shall be free intercourse and interchange of ideas among the populations of the world. Scientists of all nationalities feel impelled to retain and develop harmonious relations with each other. They may not speak the same language but they can and do speak with common idiom and use a common terminology. They have a strong ethical code which is self-imposed. Each of their statements must be open to continuous scrutiny with the freely admitted possibility that they may be wrong. Such a code and attitude arises from a sense of tolerance and intellectual humility. Secretiveness, such as is imposed by communities for political or other reasons, acts as a brake on the advancement of science and is the antithesis of the spirit of free inquiry implicit in the scientific method.

The multiplicity of international congresses, colloquies, and symposia that have taken place in recent years are an expression of the urgent need felt by scientists for the continued maintenance and extension of contacts which are threatened with disruption by conflict of national interests. There is a need for international co-operation, not international competition, in scientific research. The scientist can do more than anyone and anything else to preserve the feelings of harmony among the peoples of the world. But he must press ahead with the utmost vigour, for the dangers which threaten are formidable indeed.

As on previous occasions, the papers presented and the discussions ranged over the whole gamut of scientific interests from agriculture and anthropology to zoology. A symposium of unconventional methods of generation will be dealt with next week. From the remainder are chosen a selection of those with some interest to the electrical and electronics engineer.

In a paper by Mr Caspar Brook, Director of the Consumers' Association, a description of the methods by which products marketed in Britain were examined and tested was given. The Association, which has acquired some 280,000 members in less than four years, publishes the results of its researches in a monthly journal, *Which?*. Some the reports have come under criticism in certain quarters on various grounds, but it is important to remember that the tests are based on the desire of consumers to be able to distinguish between the performance, price and relative values of competing brands and must not be confused with tests carried out by manufacturers for quality control in production. They serve a purpose in that they tend to dispel the fog of uncertainty in the consumers' minds often generated by the superlatives, half-truths, pseudo-science and irrelevance of consumer goods advertising. Mr Brook also outlined the directions in which the organisation could extend its efforts on behalf of the consumer and industry as well, for consumer research is an activity benefiting both in the long run.

Postal Services and Communications

In his presidential address to Section G, Sir Gordon Radley, K.C.B., surveyed the rapid development of long-distance communications, by transoceanic cable, radio and satellite, in the post-war period. Most of the development effort has been concentrated on the UK/North American services, which handle between six times and seven times as much traffic as the rest of the world put together. Better communication facilities usually require the use of an ever-increasing frequency bandwidth. The first trans-Atlantic cables transmitted at only three words/minute and used a bandwidth of about 1½ c/s. Later cables were able to transmit up to 100 c/s, but these were only suitable for telegraphy. Speech requires much higher frequencies and a modern cable provides both-way paths for 80 telephone circuits, each occupying a channel bandwidth of 3 kc/s. For television on British standards, a 3·5 Mc/s channel is necessary, while for European and American systems the bandwidth has to be nearly twice this figure.

Radio communications are no longer adequate for long-range telephone use on account of the increased traffic density. In the high-frequency band, the most suitable for long-distance telecommunication, the world total of frequency assignments between 4 Mc/s and 10 M/cs rose from 6,658 in 1929 to 74,284 in 1954. Even then, for three years or four years out of the regular solar cycle of 11 years, reliability of such radio links varies considerably with sunspot activity. Sir Gordon outlined the developments in telephone transoceanic cables which have taken place over the past decade, culminating in the introduction of the Bell Laboratories development, TASI (Time Assignment Speech Interpolation).

On satellite reflectors for radio signals, two proposed systems were described. The first used satellites in circular orbits at heights between 2,000 miles and 6,000 miles above the earth's surface and orbiting once every 3 hr to 8 hr; the second, on an equatorial orbit at a height of 22,300 miles, circles the earth once in 24 hr and, therefore, appears stationary from the viewpoint of an observer on the earth's surface. While the latter will cover prac-

tically half of the earth's surface and its relatively stationary position to transmitters and receivers makes their design much simpler, the two drawbacks are the delay of about ½ sec between transmission and reception and the necessity of accurately receiving and amplifying the exceptionally weak reflected signal. The latter might be resolved if the satellite can have its own solar generated power source and the development of low-noise amplifying devices such as the "maser" is perfected.

Brigadier K. S. Holmes, C.B.E. (GPO), dealing with the mechanisation programme of the postal services, said that the cost of handling letters and parcels by the Post Office breaks down into 10% collection, 40% delivery, 40% sorting and 10% miscellaneous. Only in the sorting operations is there scope for mechanisation and this aspect has now been given considerable study and experiment.

While the movement of mail is increasingly accelerated by the use of conveyors, the main problem lies in the devising of a mechanised sorting system which automatically routes letters into their dispatch areas ready for sacking and transmission by rail or road. There are some 1,700 areas of the country through which all incoming correspondence is routed to an "office of service" for sorting and delivery. Superimposed on this system is a network of 40 distributing offices, and a letter may be routed from an office of posting direct or via an intermediate distributing or forwarding office. Sorting of letters is made difficult by the non-standard character of the article and the uneven flow of work. Over 50% of letters posted reach sorting offices after 5 p.m. and more than 80% is delivered before 9 a.m. the next morning. Prior to sorting, packets have to be separated from letters, the latter arranged according to size and with the stamp and address right way up.

Despite these problems, many of the processes have already been mechanised with some success. A drum device separates letters from packets; a roller device separates large letters from small and a facing machine ensures that the letters are bundled right way up for sorting, the stamps being "recognised" by an organic phosphor in the stamps. This glows under irradiation by u.v. light and is used by the machine for indexing.

Sorting by hand is limited by the number of boxes, 48, which can lie within the reach of the sorter. The simplest mechanisation permits sorting to be spread over 144 boxes, control being by the sorter at a keyboard. Automatic coding of letters is another step in speeding up the process and a five-letter code is already being tried experimentally in practice. The next step is sorting into streets, for which a further coding, using a pattern of dots in phosphorescent material to identify the streets and experiments are in hand at Norwich.

Power Supplies and Water Resources

Five papers on power supplies and water resources were introduced by Mr O. S. Woods, M.I.E.E. (Midlands Region, CEGB), the subjects ranging from man-made lakes to the effects of human interference with surface waters on animals and vegetation living in them.

Mr C. T. Smith (Cambridge University) produced evidence supporting the theory that the Norfolk Broads, now used almost exclusively for pleasure boating and fishing, were originally man-made through the extraction of peat for fuel. Prof Trembley (Lehigh University, Pennsylvania) continued the theme on a more modern note by showing how artificial lakes impounded for hydro-electric generation or water conservation were now yielding greater revenues from boating and fishing activities than from the supply of electricity generated.

River-life and Station Discharges

The paper by Miss Margaret E. Varley (Oxford University) brought interesting light on one aspect of power station operation which is often overlooked; the effects of the warm outflow of cooling water on the life in rivers and coastal waters adjacent to power stations. It is, of course, realised that fish, plants and lower forms of life in the rivers and seas are cold-blooded, their body temperatures being that of the surrounding waters. What may not be so evident is that the degree of change of surrounding water temperature that can be tolerated varies considerably with the type and form of life. Some, like the goldfish, can live in waters that vary over a large range; others can only tolerate a small range. To the zoologist, the former are known as "eurotherms"; the latter as "stenotherms." Part of the reason lies in the variation of oxygen content with temperature, but the effects of temperature on the activity and turnover of energy of the fish is also contributory. Cold waters may induce inanition, over-warm waters an excessive metabolic rate and activity, both of which can cause early death unless the fish can escape to more suitable regions.

Other effects of over-heated waters can be noted on the mortality of eggs, small fry and on plants and organisms which form the food of most river, lake and sea life. Of course, the effects are likely to be more noticeable in rivers and lakes than in tidal reaches of coastal waters.

The discharge of warm waters into rivers is also a factor in the effects on river life by polluted effluents from sewage farms and chemical works at points upstream of the power station outlet. In the normal way, traces of organic pollution are rectified by processes of oxidation and an increase of temperature may hasten the purification. If, however, the temperature of the outflow is of the order of 20°C to 30°C, "sewage fungus" may grow more profusely, making the water look dirty and unpleasant and also using up dissolved oxygen, so that anaerobic conditions are established. As a result, foul-smelling gases, such as methane and sulphuretted hydrogen, will be evolved. Fouled rivers and those in which thermal barriers are set up by power station cooling waters may act as barriers to fish which go up-river to spawn.

The discharge of hot water from power stations into rivers and lakes may, therefore, disturb the normal communities of plants, fish, etc., but, in general, a new balance will be restored which is satisfactory, both aesthetically and economically, so long as the upper limits of temperature for the maintenance of life are not exceeded. This seems to be established by the paper on "Reactions of Fish to Increased Temperatures," presented by J. S. Alabaster, of the Ministry of Agriculture and Fisheries, who has been investigating the subject both in tanks and in field tests in the neighbourhood of British power stations. He found that, commonly, the temperature of discharged waters was rarely more than 7°C to 8°C above river temperature and that the only effects were a redistribution of fish densities in the area.

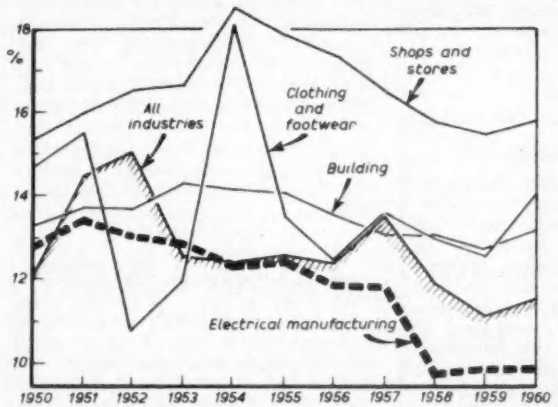
Stator-fed Variable-speed A.C. Motors

A paper of rather more than usual interest was that by Mr J. C. H. Bone, A.M.I.E.E. (Laurence, Scott Electromotors) on recent developments in a.c. motor design, the stator-fed, variable-speed a.c commutator motor. The shortcoming of the conventional a.c. motor is that it is inherently a constant-speed machine. The slip-ring motor, on the other hand, does permit of some regulation in speed but at a considerable power loss in the rotor resistances. The power wasted can be returned if a commutator and induction regulator are used to replace

slip-rings and resistances, the commutator automatically converting the variable rotor frequency to constant supply frequency and the induction regulator providing the link for returning the dissipated energy back to the supply system. In this manner, variable speed can be achieved without major energy losses.

Such an arrangement will also draw energy from the supply and feed it to the rotor when the motor will run above synchronous speed, a condition that is not possible with any other form of direct a.c. machine as well as those incorporating rectifiers, which inherently limit current flow to one direction only. The stator-fed, variable-speed motor can, in fact, also act as a generator, drawing power from the drive and feeding it into the supply.

Commutation problems, solved in d.c. motors by the use of interpoles, are inherently more difficult to overcome in a.c. machines, mainly because of a "transformer voltage" developed between adjacent commutator segments. In the stator-fed machine, this falls from a maximum value at standstill to a minimum (almost zero) at full speed, whereas in rotor-fed machines the opposite is the case. Since the limiting factor is the transformer voltage at full speed, stator-fed machines can be designed for



Gross trading profits of various industries as a percentage of total assets employed, from Mr. N. Stacey's paper

much larger outputs than rotor-fed machines.

Rotor winding coils on either side of a commutator segment carry different currents, which change rapidly as the segments pass the brushes. Self-inductance of these coils gives rise to reactance voltages which oppose the change and force the current to arc across the gap between brush and segment. Auxiliary low impedance windings in parallel with the main windings provide a discharge path and the commutation can be further improved by the insertion of iron strips between main and auxiliary windings, these providing a magnetic linkage which enables the whole of the energy of commutation to be dissipated by transformer action in the turns lying in the slots which are not, at the moment, undergoing commutation.

This technique enables machines of much higher outputs to be built than would otherwise be possible without affecting the very high standard of commutation, and they can be designed in outputs from one to several thousand horsepower with speed ranges from the narrowest to 10/1 or more. Much, of course, depends on the design of the brushes and commutator but, by careful attention to the mechanical layout, consistent brush lives of between 8,000 hr and 12,000 hr have been achieved, a figure which would be envied by the users of even the best of conventional d.c. machines.

The paper gives some details of design of both motor and regulator and mentions various fields in which it is particularly suitable. The more obvious, of course, are power station-induced draught fans—which may have outputs of 1,000 h.p. or more—pumps for water and sewage works and the various drives for industrial machinery.

Trading Future

Developments in trading practice were discussed by Mr N. A. H. Stacey, economic and marketing adviser to the GEC, in a paper to the Economics Section. He paid particular attention to the developments in the UK over the last decade, especially the rise of the self-service store and of the supermarket. For a retailer to change to a supermarket arrangement (defined as a self-service establishment of over 2,000 sq ft area, handling some non-food items) was likely to cost between £20,000 and £50,000. Behind the simple selling procedure of the supermarket was a small workshop performing functions previously carried out by the manufacturer or wholesaler, such as breaking bulk, packaging, grading and processing.

Discount houses and the discount department stores represented another attempt to cut distribution costs. Mr Stacey spoke of six establishments of this type due to open this year in the UK. He saw their operation as tied to extending motor-car ownership, making possible the use of cheap rent sites outside towns, and a cash and carry basis even for large items.

For independent retailers, one chance of competing with multiples lay in voluntary groups of one kind or another, offering co-operation in providing services and bulk buying. Such groups Mr Stacey considered to have had considerable success. The enlightened wholesaler, he suggested, played an active part in streamlining distribution by becoming an integral part of a retail group. All-in-all, the object of the retail trade revolution that had taken place in Britain had been to reduce prices to the consumer by cutting costs without accepting any further erosion of distributors' margins.

Mr Stacey asked what was the manufacturers' position when resale price maintenance was abolished and multiples or voluntary groups became strong enough to introduce their own brands of goods. One result would be to reduce the importance of production factors and place more emphasis on selling and marketing. Further integration between manufacturers and retailers was a possibility.

In the course of streamlining retailing, servicing facilities tended to be reduced. There seemed a prospect of early developments along the lines of service contracts by specialist firms with the 13 million or so owners of domestic equipment in the consumers' durables range, offering them a service contract on a monthly or annual fee basis. This would remove one more of the older functions of manufacturers or retailers.

Among other interesting papers was one by Dr K. R. Williams (Shell Research Centre) on the problems of the fuel cell. Though the hydrogen-oxygen cell has reached an advanced state of development, for fuel cells to achieve wide usage, an alternative fuel to hydrogen, cheaper and more convenient to handle, must be discovered. This paper will be dealt with in greater detail next week.

The Kelvin lecture this year was given by Prof D. J. E. Ingram, who chose as his subject "From Radar to Spectroscopy," outlining the extensive fields of application which had arisen from the war-time development of radar. The Darwin lecture, delivered by Dr Milledge, dealt with form and colour in nature, while the Lister lecture, by Dr R. G. Lipsey, had as its theme a study of fact and fiction in economics, with particular reference to those theories on wage structures in industry.

News of the Week

No Support For Electrical Fair

Organisers cancel booking at Olympia for 1962

THE second attempt by Mr P. A. Thorogood, general manager of the Electrical Engineers' Exhibition, to stage a major exhibition of domestic electrical appliances in London has failed for lack of support. Consequently, an option which had been taken on Empire Hall, Olympia, for part of August, 1962 has been relinquished, and there are no plans for a third attempt at holding the show.

Rightly or wrongly, manufacturers are apparently satisfied with the *Daily Mail's* Ideal Home Exhibition as far as this type of venue for showing their wares is concerned, and there is known to be organised opposition within the industry to the staging of a specialised exhibition for electrical appliances. The heavy costs involved and a certain measure of duplication are among the reasons. Mr Thorogood told the ELECTRICAL TIMES this week that he had sent out 9,000 circulars to the trade, including lighting manufacturers, outlining his proposals and seeking support. The majority did not answer and of the several hundred replies which did come in, "only a few" were interested in a domestic electrical show. "This reaction staggers me after seeing the success of GEC's recent show at the Horticultural Hall, and the number of inquiries they had concerning cookers, washers and other domestic equipment." Of course, admission to that show was free.

The Electrical Fair, as the proposed exhibition would have been called, would have been of international standing and there had been a number of inquiries from Continental firms interested in taking part. "It occurs to me that there is no counterpart in this country for the show they put on in Milan, for example, where the Italians have palatial facilities. How do our appliance makers expect to sell if they have no specialised exhibition at which to show their goods to the world?" Mr Thorogood said.

In 1960, when arrangements to hold an Electrical Fair at Alexandra Palace fell through, failure was attributed largely to the fact that a more central site had not been available. This time, the lack of support is shown to be more fundamental.

Lee Guinness Closing Down

THE Northern Ireland switchgear firm, Lee Guinness Ltd., is to close down. This news was given to the employees last week by Mr A. H. Willetts, managing director. He told them that the firm could not continue because it was losing business through inability to manufacture at a competitive price. The factory, at Newtownards (Co. Down), opened three years ago, employed some 150 people in the manufacture of "Vapormatic" slip-ring motor rheostat starters of French invention. Lee Guinness have appointed a liquidator, under whose control the factory will complete some orders, we understand. The London office closes down on 9 September.

American G.E.C. offers nuclear range

NUCLEAR power stations of nominal ratings 100 MW to 500 MW in 100 MW steps are being offered as relatively standard designs by International General Electric Co. The power stations are of the boiling water reactor type and, except in the large size, eliminate the containment sphere which has been a feature of American power station design. The stations are "expected to produce electricity at a cost equal to conventional power stations in the higher fuel cost areas of the world."

MEDWAY STATION?

A POTENTIAL site for a steam power station at Kingsnorth, Hoo, near the River Medway, on the southern shores of the Thames estuary, near Rochester, is under examination by the CEGB. But the Committee for the Preservation of Rural Kent is already objecting to any such scheme, maintaining that the water at the proposed site is very shallow, and that to build a coaling jetty out from the sea wall would seriously hamper all types of shipping activities.

M.E.B. CHANGE TITLES

THE Midlands Electricity Board have changed the existing titles of sub-area and sub-area headquarters to "area" and "area offices," respectively. The new titles of the areas are: North Staffordshire area; Wolverhampton area; South Staffordshire and North Worcestershire area; Birmingham area; Worcester area; Central Gloucestershire area; and the Shropshire and Herefordshire area. (* ESH, pages 122/8).

A.E.I.-GALA IN EIRE

THE complete range of heating appliances of AEI-Gala Ltd. is now being manufactured in Eire to their design and specification at the Swords, Co. Dublin, factory of Plessey (Ireland) Ltd. This announcement was made recently at a reception in Cork when the various heaters were shown to trade representatives. Plessey (Ireland) was originally formed in 1948 to manufacture components for the Irish radio trade and the GPO. The company now produces a wide range of electrical and electronic components.

ELECTRICIANS STRIKE IN EIRE

WITH electricians in Eire still on strike the Dail and Senate acted quickly last Friday in approving a Bill providing special powers for the Government to deal with the rapidly deteriorating situation arising from the electricians strike.

This provides for the establishment of a tribunal to determine rates of pay for the 2,500 electricians in the electrical contracting industry, and a commission of inquiry into the wage negotiating machinery of the Electricity Supply Board. In addition, the Ministry for Industry and Commerce is authorised to make orders regulating the supply and prices of commodities which could become scarce. The strikers are now voting on a fourth set of proposals for settlement of the strike.

Last week, following further discussions, the employers' side raised their wage offer by 1d, to 5s 8d per hr in Dublin, Cork, Limerick and Waterford, and 5s 7d elsewhere, with a 2½ hr reduction of the working week in Dublin and 2 hr elsewhere. But on Thursday the Executive Council of the ETU (Ireland) withdrew instructions to its members to resume working pending a ballot on that offer. The union's strike committee considered the proposals unsatisfactory. That union, representing a majority of the employees, has been seeking an increase of 1s 3d an hr, while the Irish Engineering, Industrial and Electrical Trade Union, representing the remainder, has asked for a 1s an hr rise, plus a 40-hour week.

Building Activity may be at Peak

BUILDING activity in the UK reached an all-time peak in the second quarter of this year, but there are some signs that electrical contractors in this field may not be quite so busy in the relatively near future. As is to be expected, the possibility of a downturn applies more strongly in the industrial/commercial sphere than in housing, but even in the case of housing the higher cost and difficulty of obtaining land and mortgages is bound to have some effect.

Not the whole of the immanent downturn is due to the Chancellor's "Little Budget" measures, though reduced public expenditure is an important factor. Even before July, preliminary approvals to build factories had fallen off sharply to 10 million sq ft in the second quarter of this year, from the very high figure of 34 million sq ft for the first quarter. The direct effect of this decline may not be felt for a couple of years, but already the order position for some building materials is easier.

At least until the end of June, however, it has been full steam ahead. The value of constructional work carried out in the second quarter was £600 million, which was 4% higher than in the first quarter and 8% higher than a year ago. There was an increase in all types of work compared with a year ago. After allowing for price increases, work on industrial building was 19% higher, and new housing up to 6%.

OFFICIAL PUBLICATIONS

BS 3456. Testing and approval of domestic electrical appliances. Section B4, electric hairdryers. 5s.

Patents (Amendment No. 2) Rules, 1961. S.I. No. 1619. HMSO, 5d (see this page).

Regulations for the Electrical Equipment of Ships, fourth edition. IEE, 7s 6d (see page 334).

A.E.I. in Steelworks Automation Company

THE AEI/Davy-United Steelworks Automation Unit, which was formed in July, 1960, to apply automation to the processing of steel and non-ferrous metals, will henceforth trade in its own right. The interests of AEI and Davy-Ashmore Ltd. in this field are now combined in a jointly owned company, Davy-AEI Automation Ltd., with headquarters at Booths Hall, Knutsford, Ches.

New G.E.C. Subsidiary

GEC have formed a new wholly owned subsidiary as a holding company for the Lighting and Heating and Installation Equipment Groups. Its title is: GEC (Lighting and Equipment) Holdings Ltd., with headquarters at Newhall St, Birmingham. Its chairman and managing director is Mr J. O. Sewell (to whom we refer on page 342). This move is in line with the corporate policy of GEC in establishing holding companies for two or more groups, or divisions of the company.

A. J. Flatley Meeting

THE meeting of the larger creditors of A. J. Flatley Ltd, held at Manchester on Monday, to which we referred last week, was private and informal, and no statement was subsequently issued. But we understand that the discussions were held in a completely friendly atmosphere, with no discordant voices.

CRAIBSTONE WITHDRAW CLYDESDALE OFFER

THE hopes of creditors in Clydesdale Supply Co. received a further serious blow at the weekend when Craibstone withdrew their 6s in the £ offer, without repeating their earlier offer of 5s. Craibstone say they have taken this decision after investigating the whole affairs of Clydesdale and "having regard to the many difficulties of great magnitude." Now that the offer of 7s 6d from an unnamed London group has failed to materialise, liquidation seems likely.

Women Engineers' Annual Conference

"TRAINING for Engineering" is the theme of the 1961 annual conference of the Women's Engineering Society to be held at Ashburne Hall, Manchester, from 14 Sept. to 17 Sept. Members will hear training specialists from a number of industrial firms and have the opportunity to visit AEI (Manchester) and some CEGB centres in the region.

E.E. STEP UP MATERIALS HANDLING ACTIVITIES

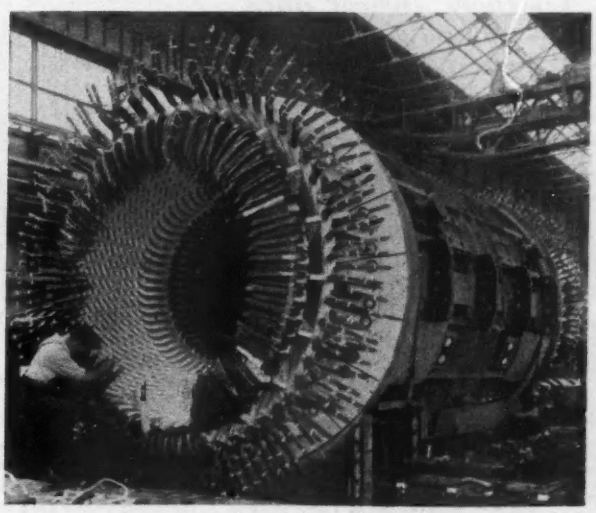
AS part of a greater concentration on the manufacture of materials handling equipment, English Electric Co. are expanding the scope of their former Mining Division, located at Stafford. From the beginning of this month the Division is renamed the Mining and Materials Handling Division, responsible for comprehensive schemes involving the application of electrical equipment to bulk and raw materials handling and processing. Included in the typical applications covered by the Division are mine winders and haulage gear, all cranes, lifts, excavators and conveyors. In part, the change represents a reorganisation of existing activities in the group, and in part an extension of activities.

Zanzibar Import Change

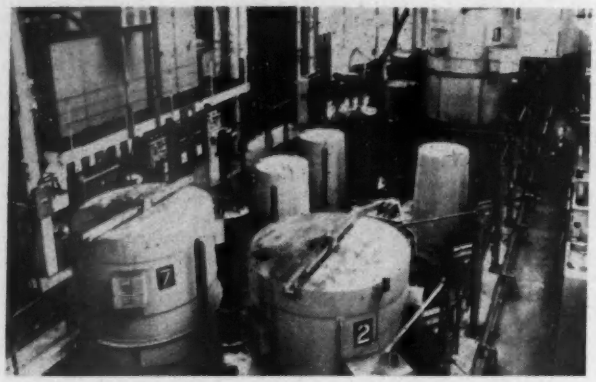
IMPORT duties on a wide range of goods imported into Zanzibar have recently been revised: for electric irons, batteries and accumulators, bulbs and tubes for electric lighting (including neon and similar bulbs and tubes), torches and torch cases, and radio receivers.

Patents Fee Increase

THE fee payable on filing a complete specification in connection with a patent application is to be increased from the present £4 to £10. This is one object of the Patents (Amendment No. 2) Rules, 1961, which were laid before Parliament last week. This increase will apply to all complete specifications filed on or after 1 Oct., 1961. The new rules also reduce from 3½ to 3 years the period allowed to an applicant for putting an application in order for acceptance. This reduced period is to apply to all applications filed on or after 1 Jan., 1962.



Winding the water-cooled alternator starter of a 200 MW set at the G.E.C. Witton Works, one of two being supplied for Kincardine "B" power station. Water enters the tubes through the main terminal bushings and leaves from only six points on the winding end turns. All pipework is metallic with brazed joints. The stator core is spring-mounted to eliminate transmission of vibration



Part of the new production lines for bright annealing copper wire and strip at the Manchester works of Richard Johnson & Nephew. Each line has two 120 kW Efco furnaces operating up to 550°C. The furnace bases take a charge 54 in. high, in a baffle 39 in. diameter

Re-electrification of Portsmouth Dockyard

WORK is proceeding on site with the re-electrification of H.M. Dockyard, Portsmouth. Meanwhile, at their factory in Blackwood, Mon., South Wales Switchgear Ltd. have completed the first stage in a series of contracts to supply h.v. switchgear for the project. These contracts, worth over £125,000, call for the manufacture of 47 switchboards totalling approximately 170 panels, to handle supply taken from Southern EB.

Awarded since early 1959, the contracts comprise mainly 11 kV, 350 MVA switchgear consisting of D4X o.c.b's and IF4X oil switches. This gear is compound filled and the circuit-breakers are spring-operated, either hand or motor wound. A smaller number of boards are 11 kV, 250 MVA, these including C4X o.c.b's; and one switchboard is 6·6 kV, 150 MVA, this being of the air-insulated pattern with solenoid-operated mechanisms. With the exception of a few of the smaller boards, all are of the indoor type.

The contracts also call for the supply of a number of tripping battery units, which have been manufactured at the Aberbargoed factory. Now the company will proceed with the next stage, which is the construction of a new 33 kV substation at Frater to give a second supply source.

Listeners Answer Back

SIR CHRISTOPHER HINTON and Mr Norman Elliott, Seeboard chairman, will be on the BBC's Light Programme at 8.31 tonight answering questions on power transmission and supply from an invited audience at Crawley New Town. The CEGB having recently applied for permission to erect a 400 kV line across the Sussex Weald from Lydd to Bolney, and the proposed routes having been hotly debated in the area, the speakers are likely to have a busy time.

Retail Sales Rise

RETAIL sales by electricity showrooms rose 38% in July, to an index figure of 202, according to the Board of Trade. Sales by radio and electrical retailers, including radio and cycle shops, increased by 15% in the month, due no doubt to buying immediately prior to the "Little Budget." H.P. debt outstanding at end of July was £11 million up at £698 million.

STRATEGIC MATERIALS

FURTHER amendments to the list of goods subject to embargo for the Soviet *bloc* and China will come into force on 12 Sept. Export control is removed from refractory goods and imposed on specified components of electronic computers. The order making these and other changes is entitled the *Export of Goods (Control) Order, 1960 (Amendment No. 3) Order, 1961 (S.I. 1961 No. 1604)* and copies are obtainable from H.M. Stationery Office at 6d each.

Barbers Offer Electric Shaves

THE competition of electric shavers is proving too keen for cut-throat shaving in barbers' shops. An increasing number of hairdressers are deciding that wet-shaving is an uneconomic proposition, so they are providing electric shavers for use by their customers. Latest to make the change are 16 barbers in Barnstaple, North Devon.

SELF-SUFFICIENCY IN MAGNESIUM PLANNED

THE sole UK producer of magnesium metal, Magnesium Elektron, has become a wholly owned subsidiary of British Aluminium Co., who are now planning to increase capacity by 5,000 tons a year. This expansion of output, to be achieved by erecting a plant at Hopton, Derbyshire, which will extract magnesium of 99·9% purity from local dolomite, will make the UK largely independent of imports of the metal. In a recent deal, British Aluminium, which already owned 60% of Magnesium Elektron's capital, purchased the remaining 40% from the Distillers Co.

Westinghouse Exhibit Traffic Controls

WESTINGHOUSE Brake and Signal Co. will be showing their wares for the control of road and rail traffic at the Science Museum, South Kensington, from 12 Sept. to 1 Oct. Arranged to coincide with the London conference of the International Commission for Transport Museums, the Westinghouse display will be open on weekdays from 10 a.m. to 6 p.m. and on Sundays from 2.30 p.m. to 6 p.m. Among the exhibits will be the automatic barrier machine which ensures that road traffic is stopped for the shortest possible time at level crossings, and the "Westronic" demonstration model showing centralised control of railway track.

Not all of the exhibits are electrical. One of the most interesting exceptions is a "road traffic lane divider" for varying the width of traffic lanes according to the direction of rush hour traffic, which will be shown in the form of a model. Operated by compressed air, the system consists of two lines of scotches set into the road, either of which may be raised to form a kerb. The model has been shown once before, at a public works exhibition, but the system has not as yet been put into practice in this country, though something similar is operating in the US.

LOWER AIR FREIGHT RATES TO N. AMERICA

INTRODUCING a "Fast Atlantic Channel" air freight service which obviates the need for reserving space, BOAC have also cut their cargo rates between the UK and Montreal or New York from 1 Sept. British electrical exporters will benefit from the new rates, so will the Canadian contenders in the UK appliance market. All BOAC 707s and Britannias on North Atlantic runs have capacious cargo holds, in addition to which there are two weekly freighter services which will call at other major cities if required. The new rates for electrical goods are :

Weight of Consignment in Kilos	Household Appliances, Radio and TV	Bulk Electrical Machinery*
	Rate per Kilo	
Over 45	6s 4d	—
Over 100 ...	5s 9d	—
45-249	—	6s 4d
250-999	—	5s 9d
1,000 and over ...	5s 2d (N.Y.) 5s1d (Montreal)	4s 11d

* In the case of electronic control panels (and parts) for telephone and teletype exchange installations, and of radar stations, power plants, heating and cooling installations, sound recording studios and electronic tubes, these rates apply west-bound only.

This shot from Brook Motors Ltd. latest 16mm. sound film "All in a Day's Work," shows a night-watchman making his rounds past crowded motor conveyors. The film is available for free loan

STORMS BRING DOWN POLES

SEVERE storms in various parts of the country brought widespread power breakdowns in several areas last week-end. Parts of West Scotland, including Glasgow, were affected for several hours, and Macclesfield, Cheshire, had its worst failure for some 20 years, according to a North Western Electricity Board official. Areas in Central Sussex were also without power for up to 16 hours.

Ten-to-One Majority Expels E.T.U.

NOW that the ETU has been expelled from the TUC fold, attention will focus on the likely expulsion from the Labour Party and the results of ETU's own election taking place this month. The trade union group of the Parliamentary Labour Party, consisting of nearly 100 MP's, has already taken the unusual step of appealing to all ETU members to vote in the election for the union's officers and executives. If the bulk of the rank and file do vote and return a non-Communist executive, the way would presumably be open for reaffiliation to the TUC. If, on the other hand, a Communist executive is re-elected, they will have a number of problems to contend with, including the possible disaffection of a substantial number of members.

As is to be expected, Mr. Frank Foulkes, president, has already declared that expulsion from the TUC will make absolutely no difference. Still, other unions may no longer accept the ETU as a bargaining partner. Even more important will be the attitude of the other unions on the question of "poaching" ETU members, though they are not expected to take any action on these lines at least until the election is over.

At Portsmouth on Monday, when they were ousted by the TUC Congress, the ETU mustered only 735,000 votes, including their own block vote of 243,000, whereas votes in favour of expulsion amounted to 6,585,000.

Elliott's New U.S. Link

ELLIOTT Brothers (London) Ltd. are to sell, in the UK and Eire, the complete range of electrical recording instruments made by Esterline Angus Instrument Co. Inc., of Indianapolis, USA.

MICROWAVE CONFERENCE

A THREE-DAY conference on Microwave Measuring Techniques opened yesterday at the Institution of Electrical Engineers. The conference is subdivided into six sections which include discussion of power measurements, waveguide propagation characteristics and measurement on materials. The conference began with an introductory lecture by Prof H. E. M. Barlow in which he emphasised the importance of field theory and the secondary importance of the lumped parameters usable at power frequencies. He referred briefly to the techniques available for measurement at microwave frequencies, particularly the importance of probes for investigating electromagnetic fields at various points. Other methods depended upon resonance, phase shift and the use of noise sources. Most power measurements relied on comparative heating effects of microwave and power frequency sources.

LARGE CONTRACTS AWARDED

JAMES SCOTT and Co. Ltd. have been awarded a £211,914 contract for the supply, installation and connection of electrical plant and equipment required for the Clyde tunnel now under construction at Whiteinch, Govan. The ventilation buildings contract for the project has been awarded to Crowley Russell and Co., to a value of £133,856.

A £70,000 contract for mechanical and electrical services in connection with the instrumentation of No. 3 test cell, and other units, at the National Gas Turbine Establishment, Pyestock, Hants, has been awarded to Automatic Control Engineering Ltd.

AEI have been awarded a £17,000 contract for the renewal of sections of conductor on a d.c. 33 kV overhead line between Eastbourne and Lewes. The original line was installed in 1932 by W. T. Henley's, now part of the AEI group.

APPROXIMATELY 66 miles of heating cables are to be provided by the Panelec Heating Division of BICC for heating the road surface of the new Hammersmith Flyover—believed to be the first flyover in the world to be completely heated.

AN order for a computer system to control the world's largest basic oxygen steel furnace plant at Detroit has been placed with Thompson Ramo Wooldridge Inc., of Los Angeles. The computer will determine the amount of raw materials required and prescribe the amounts and types of additives necessary to produce a given quantity of finished ingots of the right specifications. It then takes care of the furnace process. Such technical data will shortly be available for use by International Systems Control Ltd., the company recently formed jointly by GEC, of England, and Thompson Ramo Wooldridge.

BRITISH Transport Commission have placed two contracts worth £214,000 with AEI Ltd. One, valued at £113,000, is for the supply and installation of 36,000 yd of 11 kV three-core solid-type cable, plus l.v. and telephone cable, between Kilburn and Camden and between Camden and Broad St, London. The other concerns power supplies for signalling on London suburban electric lines from Charing Cross, Victoria and Cannon St. Involving some 20 miles of track, this contract is for 40,000 yd of 3·3 kV and lower voltage corrugated aluminium-sheathed cables and 24,000 yd of pilot supervisory cable.

The new floodlighting system in use at the Crystal Palace Football Ground, Selhurst Park. Planned by Philips (who installed the original floodlighting there some 8½ years ago), and installed by F. W. Blanshard Ltd., with Tubewrights Ltd. erecting the towers, it has a 100 ft tower at each corner, each with 48 x 1,000 W class B2 projector lamps, giving a total load of 192 kW. Illumination level on the playing area is 24 lumens/sq ft — one of the highest on any football ground in this country

NEW SHEFFIELD SERVICE CENTRE

INSTEAD of making inquiries in one building, buying appliances in another, and paying their accounts in yet another, Sheffield customers of the YEB can now do all these things under one well-equipped roof. This is a large service centre which begins operating this week, where there is a lofty sales hall, with the accent on the "hall," an accounts pay hall, conference room and demonstration theatre. Even the telephones are in two tones of grey.

The new building, which is in Change Alley and also overlooks Norfolk St, adjoins the Sub-Area's administrative headquarters in Commercial St.

A.E.I. Semiconductors

AMPLIFYING the announcement (ELECTRICAL TIMES, 27 July) that the Tottenham factory of AEI (Woolwich) Ltd. is to be closed down and the manufacture of transistors and semiconductors cease, AEI Ltd. now point out that the Lincoln factory of the Electronic Apparatus Department continues to manufacture and develop a wide range of semiconductor devices, including diodes, rectifiers, transistors and controlled rectifiers in the light and medium power fields.

The Heavy Plant Division at Rugby, in addition to manufacturing and marketing high current devices have already produced semiconductor power rectifier equipment totalling 500 MW, and is expanding its manufacturing capacity.

Design Courses

THE Council of Industrial Design will hold two more design courses for engineers in the autumn. A course intended for draughtsmen and similar staff will be held in two phases from 23 Oct. to 27 Oct. and 20 Nov. to 24 Nov., with the second phase following a period of analytical "homework." The other course is specially prepared for engineering managers and will take place from 27 Nov. to 1 Dec. Both courses will be held in the London area. The fee for the two-part "staff" course is 35 gn, and for the "executives" course, 25 gn.

Sayings OF THE WEEK

"Branding implies that the brand owner undertakes to ensure a high degree of consistency." . . . CASPAR BROOK, Director of Consumers' Association, in a paper presented to the British Association.

"Do-it-yourselfism can only impoverish the expert and flatter the ignoramus. It is the first step on the road to an ersatz, makeshift world where all machines fall apart, all paint flakes, and all walls bulge, all doors jam and all sinks block." . . . JOHN JELLEY, in the *Daily Mail*.

PRICES of cable metals and other materials

Figures quoted are the official prices ruling on Tuesday, September 5

	£ per ton	Weekly change £
COPPER, standard class A (settlement)	235½	+3½
" (3 months)	238	+2½
LEAD, refined pig, 99·97% purity (cash)	64½	−1½
" (3 months)	65½	−1½
TIN, refined, min. 99·75% purity (settlement)	982	−10
(3 months)	988	−5
ALUMINIUM, ingots 99·99·5%	186	—
" wire bars (4×4×54")	193½	—
BRASS Strip 63/37	198½	—
SILVER (Troy oz)	79½d	—
ZINC, virgin, min. 98% purity (cash)	75½	−½
" (3 months)	76½	−½
RUBBER, per lb No. 1, RSS, spot	25½d	+½d
c.i.f. basis, por ts. Oct.	25½d	+½d
ARMOURING: Galv. Steel Wire (0·104 in.)	68½	—
Mild Steel Tape (0·04 in.)	53½*	—
NICKEL (home)	660	—
MERCURY (76 lb flask)	63	—
AMERICAN PRICES: Copper, electrolytic (per lb)	31c	—
Lead (New York)	11c	—

* *Tape Price, now an average, includes varnishing*

ETHIOPIAN DOMESTIC APPLIANCE MARKET

WHILE the present market for domestic electrical equipment in Ethiopia may be small, because a majority of the population are living on a subsistance level, plans for electrical and industrial expansion indicate that the situation may steadily improve. The number of consumers and the electricity production in Addis Ababa both increased by 50% between 1957 and 1960, but the Ethiopian Electric Light and Power Authorities plan to build additional power stations. With an easy servant position, the market for home laundry equipment is small, apart from electric irons for which there is a fair demand, in meeting which British firms already do well against strong competition, according to a Board of Trade report. There is also a small market for vacuum cleaners and floor polishers, mainly from expatriate Americans who, naturally favour US designs. The best opportunities would appear to be in respect of space heaters (to combat the chill of the evenings) and hair dryers, but it is admitted that it is not easy to break into the Ethiopian market, since there is a limited number of firms, most of whom already have agencies. Nevertheless, with the promise of growth, a determined effort at entry could prove worthwhile.

Protection of Metals

BECAUSE of the great response last year, Borough Polytechnic, S.E.1, have decided to repeat their course on "Corrosion and Protection of Metals" in the forthcoming session. Lasting a year, the course may be taken either on one afternoon and one evening a week, or two evenings.

Design Department Questionnaire

A QUESTIONNAIRE on design department and drawing office practice is being sent to 160 electrical and mechanical engineering firms in this country by the British Institute of Management as part of a nine-nation survey by the OEEC. At the request of the BoT, the BIM, in conjunction with the British Productivity Council, are conducting the survey in this country, and the results will be forwarded to Paris for analysis. Identical questionnaires are going out in Austria, Belgium, France, W. Germany, Italy, the Netherlands, Portugal and Sweden.

News in Brief

A 32-year-old London Transport Tube car, having run nearly 1½ million miles, has been retired to the Transport Section of the Science Museum, South Kensington. Modified to show some of the mechanism, it will not be on general show until the new gallery is ready in the autumn of 1963.

A local branch of the EIBA for the Huddersfield/Halifax area has been formed, with Mr W. Dransfield, of the YEB, as hon. sec./treasurer.

Lord Chandos has bought Trafalgar Hse, near Salisbury, and about 10 acres of garden, which he previously rented from AEI, the previous owners, who used part of the building for storage premises.

Five members of the Japanese Atomic Industry Structure Study Team recently visited the GEC Erith Engineering Wks, to discuss the latest developments in the design of nuclear power stations.

Glamorgan C.C. are including electric heating in the Leckwith viaduct on the Cardiff-Penarth road.

HMTS *Monarch* sailed from Southampton last Friday to lay the last 500-mile stretch of the trans-Atlantic section of the Commonwealth telephone cable.

The South Western Electricity Board have laid a new 33 kV cable across the Helford River.

A private exhibition of Nife portable safety lamps will be held at the Park Hotel, Cardiff, from 20 Oct. to 23 Oct. Tickets are obtainable from Nife Batteries, Union St, Redditch.

OVERSEAS NEWS

from our correspondents abroad

CANADA

Next Peace River Move

Having taken over the Peace River Power Development Co's rights, the provincial-owned British Columbia Electric has taken the first steps in proceeding with that scheme. The provincial government, by an order-in-council, has cancelled the reserve it placed on the waters of the Peace, the Finlay and Parsnip Rivers and tributaries when the power project was proposed by the Axel Wenner-Gren interests. This leaves the way open for BCE to apply for a water licence. Dr Gordon Shrum, new president of the BCE has also stated that he has been authorised to negotiate a contract for work on the Peace River hydro-electric project with International Power and Engineering Consultants Ltd. It is expected that contracts for the construction of a bridge and access roads to the proposed dam site will be placed very shortly.

B.C. Improved Terms

Agitation by various bodies to get the British Columbia Government to modify and improve its takeover terms for the British Columbia Electric Co. has had some effect. The Government has made a small change as far as holders of Preference shares are concerned. These now have the option of taking either perpetual or 25-year guaranteed callable bonds in exchange for their shares. Originally only perpetual bonds were offered, which deprived shareholders of a substantial tax advantage for which they had already paid. But there is no indication that the provincial government also intends to revalue the common share price, as had been hoped.

U.S.A.

Floating Nuclear Power

Construction of the world's first floating nuclear power plant has been ordered by the US Corps of Army Engineers. It is intended to supply electricity to military installations and port cities when normal service is disrupted by floods or other causes. Of 10,000 kW capacity, the plant is to be installed in a reconditioned Liberty ship. Among its advantages, is the elimination of long fuel supply lines such as oil tankers.

VENEZUELA

Acquisition

The Overzeese Gas en Electriciteit-Maatschappij has announced that the Venezuelan Government had purchased shares owned by the firm in two Venezuelan electricity companies. The total involved is not disclosed. The two companies are Electricidad De Puerto Ordaz and Electricidad De San Felix. The book value of the shares owned by the Dutch company was 949,200 florins at the end of November, 1959, calculated at the official Bolivar exchange rate.

BOLIVIA

HE Studies

First phase studies for a proposed hydro-electric plant to supply Cachahamba and Oruro, in Bolivia, are now to proceed, the Inter-American Development Bank having approved an investment of $38,000 for the purpose. The studies are to be undertaken by the Montreal Engineering Corpn., who through their subsidiary company, Bolivian Power, also plan to install an additional hydro-electric plant near La Paz, in the Zongo Valley. The latter concern have also offered to carry out a survey of electricity services in the Santa Cruz area, but this work is now in abeyance until the question of the undertaking's operating licence is clarified.

NORWAY

Tokke I

Inauguration of the first stage of the Tokke hydro-electric scheme by the Norwegian Prime Minister, Einar Gerhardsen, last month, also saw the use of 300 kV transmission for the first time in Norway. The first section of the plant is of 100 MW capacity, but by the end of 1962 installed capacity will reach 400 MW, to give an annual output of 2,130 million units.

The whole project, in the county of Telemark in the middle of south Norway, calls for another four power stations to be built, which together with the one just opened will have a total capacity of approximately 1,000 million kW. The total cost is calculated to be in the region of £50 million, and completion is expected before the end of 1965.

The subsequent stations, Tokke II, III, IV and V, will have an annual capacity of 920 million kWh, 475 million kWh, 175 million kWh and 70 million kWh, respectively. In addition, there is a smaller station producing 4,000 kW which has already been built for constructional purposes and which will remain in use.

The whole project includes the building of 30 dams and the blasting of over 60 miles of tunnels through rock. Already nearly two million kilos of dynamite has been used. Tokke I alone will produce power worth £3¼ million yearly. The scheme is part financed through a $50 million loan from the World Bank.

DENMARK

Power Imports

The import of power from Sweden is proving a boon to Denmark. Last year electricity consumption in Denmark rose by 9·4% over the previous year, largely due to the sale of about 60,000 cookers and 125,000 refrigerators, according to the chairman of the Association of Danish Electricity Works. That increase was largely met by power obtained from Sweden, and plans have already been made for a fourth 120 kV cable to be laid under the Sound between Zealand and Sweden, to be ready by April, 1964, in addition to entensions to various existing power stations.

GUINEA

Aluminium Scheme Stopped

Work on its $175 million alumina and bauxite project in the Republic of Guinea, Africa, has been suspended by Aluminium Ltd. The project, begun in 1957, is situated at Boke, in the western region of Guinea. Reason for the suspension is given by the company as its inability to solve the financial problems involved under present circumstances. But it is believed that there are two main reasons. The first is the country's political situation, which has become Communist-dominated, and the second is that Aluminium Ltd. have developed a new process to produce aluminium which eliminates the need to extract the alumina from the bauxite, which can be fed directly into the smelter plant.

INDIA

Gujarat Plans and Troubles

The General Electric Co. of America has received a $23 million order for a new central power station for the State of Gujarat.

It has also been announced that eleven generating sets are to be installed in five towns in Gujarat to meet the increasing electricity demands. Eight 560 kW sets will be installed at Navsari, Bulsar and Bilimora with delivery by May, 1962. At Baroda, three 3 MW sets are to be installed by the end of 1962. Referring to frequent power cuts, the superintendent in charge of the South Gujarat grid station at Utran said that three boilers at the station had proved defective and replacement parts were being imported. The softening plant was inadequate and one of the turbines had been badly damaged through an unknown cause. He added that the coal position was very bad and current stocks were sufficient for only one month.

Company Activities

HOLIDAYS, the Berlin crisis, less cheerful company news from Monsanto, the chemical giant, as well as British Motor Corporation and, indeed, the whole background now of psychological and actual financial and economic "pause" were still stifling stock market business last week. Feebly, the *Financial Times* industrial index did manage to notch up a couple of points but certainly no stock market fortunes were made overnight in any headline hitting bursts of activity.

In the circumstances, electrical shares put up a fairly creditable performance. AEI, which has recently announced a number of substantial contracts, gained a useful 2s 3d to 37s 3d while GEC made a welcome recovery from 29s to 30s 9d. English Electric, too, sparked up from 29s 9d to 30s 6d. There was also some investment buying for Hoover "A" which lifted the shares from 37s 6d to 39s 6d, while Ever Ready lit up from 36s 6d to 37s 6d and Berry's Electric Magicoal warmed up from 51s 3d to 53s. A. C. Cossor were unaffected by the disclosure of a loss of £443,285 in the year to 31 March and in fact gained 3d over the week at 7s 6d. Hackbridge started out their week at 5s 3d, climbed to 6s 9d before the year's results were made known, but then slid back to 6s 3d on the steady 10% dividend to be paid from increased profits.

Memories of last year's telephone takeover "war" were evoked last week in the City with the publication by Telephone Manufacturing of their financial results for the 15 months to 31 March. This is the West Dulwich business, it will be remembered, for which the Consortium of seven large electrical companies including AEI, GEC, Plessey and Ericsson Telephones put in a bid in July, 1960. But Mr Charles Stanley's Pye was already buying in the Market and then finally capped the Consortium's bid to secure majority control. British Electronic Industries, the Pye-E. K. Cole merger group, now owns over 79% of the issued capital of "Temco." Certainly it seems that Mr Stanley was on the right line when he wanted "Temco." Against a loss after tax of £1,059 in 1959, "Temco's" after tax profit in the subsequent 15 months was rung up to £78,220! In the Market, the 5s Ordinary shares of BEI responded with a rise from 10s to 10s 10½d.

Less happy was the news from L. Sterne. Against last year's half-time payment of 7½% on the Ordinary shares chairman Mr P. Brown has decided not to declare an interim for the year to 31 Oct. The Market's comment to his expectation of a small profit for the year was summed up in the 2s 6d mark-down of the 5s Ordinary shares to 11s 3d.

Last week was also the occasion of the yearly meeting of Thorn, and I took the opportunity to ask Mr Jules Thorn whether he has any further plans for a free scrip issue following the defeat last year of his capitalisation proposals by 12 large holders of the voteless "A" shares. The group's capital reserves alone now stand at £3,559,180 against an issued Ordinary and "A" Ordinary capital of £2,187,708. But Mr Thorn tells me that no free share hand-out is at present contemplated although the "position is being kept constantly under review."—*From our City Correspondent.*

Britannia Elec. Lamp Wks

Dividend is raised from 12½% to 15% for the year to 31 March, with group net profit up from £25,117 to £28,381.

Campbell and Isherwood

Preliminary results suggest that trading has been affected by slow demand from the marine industry, but dividend stays at 20%. Net profit has dropped from £55,366 to £34,465, after tax, and £20,758 (previously £42,961).

Electrical Components

It is too early for the chairman to say in his annual review whether the "little Budget" has called a halt to the steady growth in turnover, but in the first three months of the current year sales in general were maintained, with small increases in certain areas. The wiring section accounted for much of the progress in the year to 31 March and this would not be affected to any extent by the squeeze. Combined with expansion of wholesaling facilities, particularly in South Wales, this provides an optimistic pointer to the current period.

Oldham and Son

A full and exciting story is told in the annual review, in French as well as English, and an accompanying booklet describing the "Oldham Commonwealth" which has been built up since the war. During hostilities, capacity was increased to such an extent that at war's end it greatly exceeded home market requirements, particularly in storage batteries and, to a lesser degree, in portable mine-lighting equipment. Attention was turned overseas to such good effect that 15 years later the parent company is exporting 25% of its output to 90 countries and, in addition, there are manufacturing subsidiaries on four continents. Growth continued during the past year in each sector. It is interesting that the SLI Division produces car batteries for replacement only and is, therefore, not affected by the ups and downs of the motor manufacturers, whereas commercial vehicle batteries are supplied as original equipment also, so Oldhams have been fortunate in this regard in the recent past. A point worth noting in the balance sheet is that the £708,587 for land and buildings is at 1939 valuation, plus later additions at cost. Concerning the future, Mr John Oldham refers to fierce and increasing competition in many markets.

Year to 31 Mar.	£ Trading Profit	£ Net Profit	% on Ord.		Ord. Price*	
			Earned	Paid	High	Low
1957	594,126	182,065	60·8	17½	3/1	2/2
1958	561,666	155,048	51·4	17½	3/1	2/1
1959	464,443	105,105	32·4	17½	3/6	2/4
1960	604,537	137,206	42·3	17½	3/2	1/9
1961	716,688	195,135	40.8	17½†	3/4	2/3

* Calendar year, except 1961 which is up to 4 July.
† After a 1-for-2 scrip issue.

George H. Scholes

"Wylex" and "Sonex" have had a good year, judging by the preliminary figures, and directors have announced a one-for-five scrip issue. Net profit, after tax, is up from £202,042 to £215,483 and dividend is maintained at 27½%.

L. Sterne

Interim dividend is omitted, contrasting with 7½% a year ago, but directors expect "a small profit" for the year to 31 Oct. and hope to recommend a payment in January when trading results for the full year are available. As a measure of the difficulties of the refrigerator industry, trading profit last year was £852,330 and total dividend 20%. There has been no revival of demand for domestic and other small refrigerators, directors say, and recently it became necessary to discharge about half the employees at Hillington, resulting in a loss on operations at that factory. The Crown Iron Wks, however, which makes commercial and industrial refrigerating plants, has traded profitably.

Strand Electric

The sustained rise in earnings over the past few years, to which television studio lighting business has contributed in no small measure, has accelerated further in the year to 30 April. Profit before tax is up from £103,130 to £162,508 and, as forecast, total dividend is 20%, against an equivalent 14½% last year.

Telephone Manufacturing

Pye have reason to be pleased with their acquisition. Net profit for the 15 months to 31 March is £78,220, contrasting with a loss of £1,059 in the 12 months of 1959. A dividend of 5% is recommended for the six months to 31 March, effectively doubling the previous year's rate.

Dividends Announced

Cape Electric Trams. Year 8% (previous year's equivalent 6¾%).

Hilger and Watts. Interim 5% (same).

Midland Electric Mnfg. Interim 4% (same).

Walsall Conduits. Interim 5% (same).

S & L TUBULAR STEEL LIGHTING COLUMNS FOR PARK LANE

Stewarts and Lloyds have been awarded, through Atlas Lighting Limited, the contract for the supply of 40 ft. mounting height tubular steel lighting columns for the Park Lane improvement scheme. This will be the first installation in Great Britain with lighting columns of 40 ft. mounting height.

The artist's impression shows how the columns, type LC.2, and Atlas lantern SF6817/3400—specially designed to meet the requirements of the London County Council and Westminster City Council—will appear after they are installed. This column will be included in our display at the A.P.L.E. Exhibition at Scarborough.

Stewarts and Lloyds' columns (manufactured to BS 1840-1960) range in mounting height from 13 ft. to 40 ft.; bracket arms vary in outreach which allows columns to be offset from the pavement edge.

Our catalogue, with illustrations and section drawings, is available on request.

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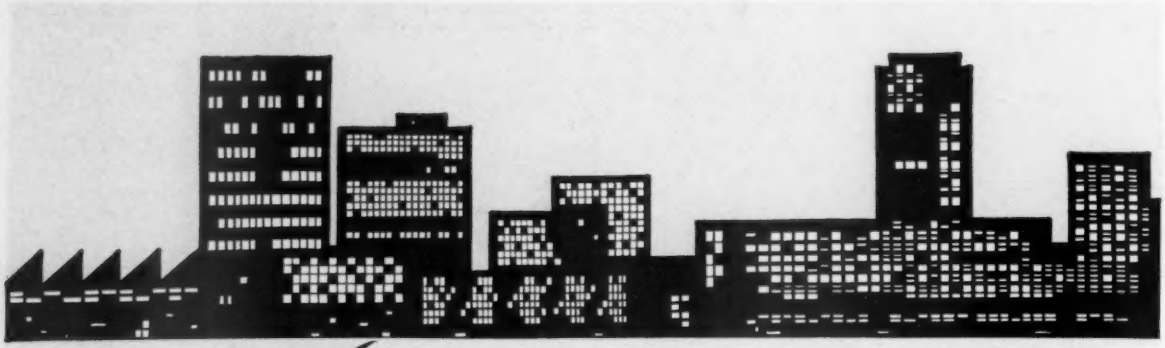

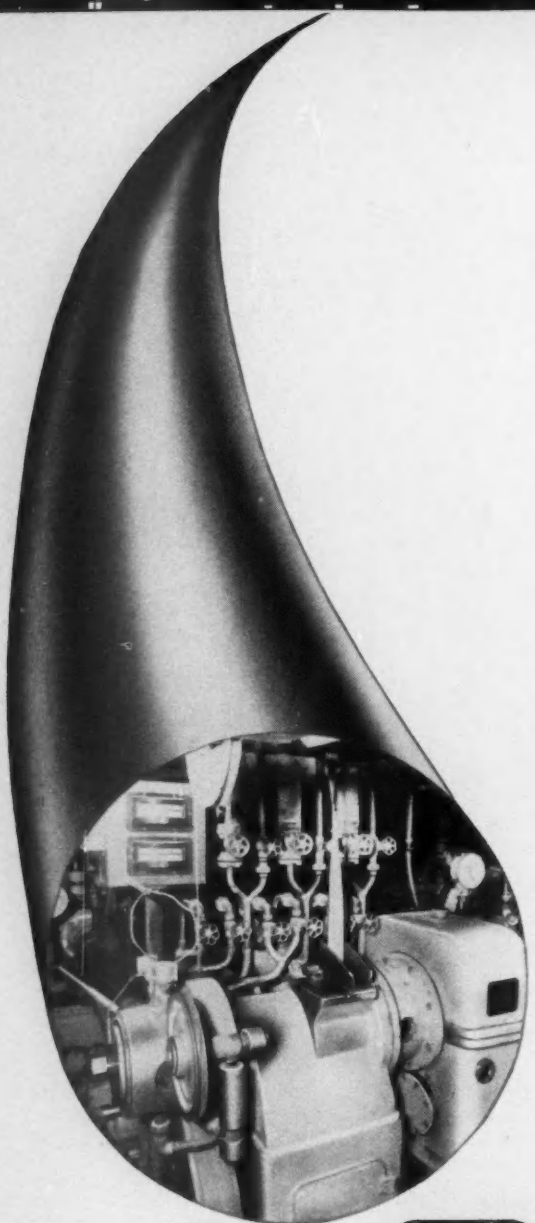

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COMMERCIAL INFORMATION

Contracts Open at Home . . .

Dates given are the final for receipt of tenders unless otherwise stated.

8 Sept.—Antrim R.D.C. Supply and erection of fluorescent street lighting at Randalstown and Doagh.—See 31 Aug. issue.

8 Sept.—Rothwell U.D.C. Scheme 1: nine 140 W sodium units; Scheme 2: 229 45/60 W sodium units with side entry lanterns; Scheme 3: 232 45 W sodium units with post-top lanterns.—See 24 Aug. issue.

8 Sept.—Rye B.C. Installation of storage heaters together with wiring and ancillary works in Council Offices. Borough Surveyor, Council Offices, Ferry Rd.

8 Sept.—Sheffield C.C. Supply: lamps.—See 31 Aug. issue.

8 Sept.—Stockton-on-Tees B.C. Supply of: (a) 13 Group "A" reinforced concrete columns and (b) 13 140 s.v.d. lamps, lanterns/gear.—Advertised 17 Aug. issue.

8 Sept.—West Sussex C.C. Supply of electrical equipment, desk lamps and furniture. Applications to Hallkeeper, County Hall, Chichester, by above date.

9 Sept.—Chislehurst and Sidcup U.D.C. (a) Supply and erection of 113 200 W sodium lamps on 35 ft steel columns; (b) supply and laying of 4,800 yd cable and jointing for 45 street lamps. Applications to Surveyor, Manor Hse, by above date. Deposit £2 2s each scheme.

9 Sept.—Oban Hospitals. Electrical work in alterations and upgrading of main kitchen and provision of new staff dining room at West Highland Hospital. Applications to Secretary, Board of Management for Oban and District Hospitals, "Aros," Lochgilphead, Argyll, by above date.

9 Sept.—Prescot U.D.C. 54 "A.E.I. Kirby" lanterns mounted on 15 ft "Concrete Utilities" columns, together with lamps/gear along various roads.—See 17 Aug. issue.

9 Sept.—Wexford C.C. Electrical installation in public health clinic, Enniscorthy.—See 10 Aug. issue.

11 Sept.—Astley Ainslie, Edenhall Hospitals. (1) Repair and maintenance of electrical installations for year. Applications to Secretary, Board of Management, Astley Ainslie Hospital, Grange Loan, Edinburgh, by above date.

11 Sept.—Lancs C.C. Rewiring of Eccles Lewis St County School. Applications to County Architect, P.O. Box 26, County Hall, Preston, by above date.

11 Sept.—Newcastle under Lyme B.C. 35 Group "A" 200 W sodium lighting units, including conversion fittings for existing columns, etc., for A52 Tarporley/Tarvin trunk road.—Advertised 17 Aug. issue.

11 Sept.—N. Ireland. Standby generating set for Ministry of Home Affairs, Radio Workshops, Lislea Drive.—See 10 Aug. issue.

11 Sept.—Portland U.D.C. Electrical work in connection with the installation of pumping plant.—Advertised 24 Aug. issue.

11 Sept.—Ripon C.C. Supply/erection or supply only of 24 Class "A" fluorescent wall mounted and steel column mounted lighting units and 100 Class "B" concrete column units.—See 31 Aug. issue.

11 Sept.—Thurrock U.D.C. Applications invited for inclusion on select list.—Advertised 24 Aug. issue.

11 Sept.—Uxbridge B.C. Rewiring of lighting circuits and power installations in: contract 111: 150 houses, Hillingdon; contract 112: 152 houses, Hillingdon; and contract 113: 130 houses, Cowley.—Advertised 17 Aug. issue.

11 Sept.—Whitefield U.D.C. 17 Group "A" concrete columns/sodium lamps/lanterns/gear, Dales La, A667.—See 31 Aug. issue.

11 Sept.—Worksop B.C. Provision of nine fluorescent lighting units, eight socket outlets and necessary wiring at Carlton Rd Tip divided (a) supply of lanterns/tubes/gear; (b) wiring and fixing of lanterns; (c) whole of work. Borough Engineer, Park Hse.

12 Sept.—East Ham C.B.C. 107 15 ft reinforced concrete columns, alternatively 70 25 ft and 37 15 ft columns/lanterns/lamps/gear.—See 31 Aug. issue.

12 Sept.—Halteminprice U.D.C. Supply/erection/putting into service of 31 25 ft steel columns/specified sodium lanterns along Beverley Rd, Hessle. Engineer and Surveyor, Anlaby Hse, Anlaby. Deposit £1 made payable to Treasurer.

12 Sept.—Manchester C.C. Supply of street lighting equipment: traffic bollards, cable, lighting fittings, for road signs, flashing beacon globes, lanterns, steel and concrete columns and time switches for year from 1 Jan., 1962. City Surveyor, Town Hall.

12 Sept.—Sunderland C.B.C. Electrical installations in 209 Town End Farm estate dwellings.—See 24 Aug. issue.

13 Sept.—Angus C.C. Renewal of 29 lighting brackets/lanterns and minor repairs to 36 existing units. County Engineer, County Bldgs, Forfar.

13 Sept.—Chingford B.C. Provision and fixing of 24 200 W sodium lanterns with 10 ft bracket arms and on existing columns/brackets and five 140 W sodium lanterns. Borough Engineer, Town Hall, E.4. Deposit £2 2s.

13 Sept.—Witney R.D.C. Improvements to electrical installations in 17 houses at Walnut Row and Meadow End, Fulbrook. Engineer and Surveyor, 28c High St.

14 Sept.—Sunderland C.B.C. Electrical installations in (a) Training College extensions and (b) Hylton Red Hse Community Centre.—Advertised 17 Aug. issue.

15 Sept.—Belfast. Provision of lighting services in Arlington Hse, Windsor Ave, for Ashleigh Hse School.—See 31 Aug. issue.

15 Sept.—Carrick-on-Shannon. Lighting, electrical heating, etc., installations in new post office.—See 31 Aug. issue.

15 Sept.—Co. Armagh. Electrical installations in Crossnaglen Voluntary Intermediate School and school meals accommodation.—See 24 Aug. issue.

15 Sept.—Malvern U.D.C. Erection of 298 Group "B" columns/lanterns.—See 31 Aug. issue.

15 Sept.—Rhayader P.C. 900 yd Group "A" 140 W sodium lighting.—See 31 Aug. issue.

16 Sept.—Cheshire C.C. Applications invited for select list.—See 24 Aug. issue.

16 Sept.—East Barnet U.D.C. Contract 953. (a)(i) Supply and erection of 60 30 ft steel columns/brackets: (a)(ii) removal of 55 existing mercury lanterns and uprooting of 62 steel trolley poles; (b) supply and fitting of 60 200 W linear sodium lamps/lanterns/gear; (c) wiring for A1000 Gt. North Rd lighting.—See 24 Aug. issue.

16 Sept.—Morley B.C. 52 140 W sodium street lighting units on 25 ft concrete columns (22 columns to support o.h. wiring) along A62.—Advertised 17 Aug. issue.

18 Sept.—Maidstone B.C. Provision and installation of floodlights at The Old Palace, Borough Engineer and Surveyor, Palace Ave.

18 Sept.—Manchester C.C. Electrical installation in combined clinic, Withington. City Architect, P.O. Box 488, Town Hall, Manchester 2.

18 Sept.—Normanton U.D.C. Partial rewiring of public baths, High St. Surveyor, Town Hall.

18 Sept.—Poyton-with-Worth P.C. 55 concrete columns and sodium lanterns for Class "A" street lighting.—Advertised 17 Aug. issue.

18 Sept.—Sleaford U.D.C. Supply and erection of 17 Class "A" columns/equipment. Surveyor, Westgate Hse, 25 Westgate. Deposit £2 2s.

18 Sept.—Stirling B.C. Separate trades tender: electrical work in 25 houses. New house redevelopment. Applications to Burgh Architect and Planning Officer, Old Burgh Bldgs, 65 King St, Stirling, by above date.

18 Sept.—Willenhall U.D.C. Erection of 35 "Stanton" 10F and 86 8F columns and the provision of lanterns/wiring. Engineer and Surveyor, Town Hall.

19 Sept.—Musselburgh B.C. 13 15 ft and 15 25 ft concrete columns/mercury/sodium lighting.—See 24 Aug. issue.

19 Sept.—Peterborough C.C. 600 mercury and sodium units on steel and concrete columns together with the removal of existing units.—See 31 Aug. issue.

20 Sept.—Rayleigh U.D.C. Supply and erection of 45 Group "B" concrete columns with tungsten lighting and 23 with sodium lighting along various roads. Engineer and Surveyor, Council Offices.

20 Sept.—Tyrone C.C. Electrical installation in new primary school, Dromore. Details from Barrett and Agnew, 420 Ravenhill Rd, Belfast.

21 Sept.—Dungannon R.D.C. Two pumps/ancillary equipment for Bawn-Carnteel water scheme. Details from consulting engineers Munce and Kennedy, 133 University St, Belfast.

22 Sept.—Doncaster R.D.C. Supply and installation on fixed-price basis of 64 140 W sodium lamps on 25 ft steel columns along

Your Queries Answered

Readers are invited to make use of our free enquiry department which possesses wide resources, including an index of trade information with over 100,000 entries

A Selection from the 104 queries answered this week

"Franklin" pulse generators and "Hewlett Packard" voltmeters—agents for? T.B.—Livingston Laboratories Ltd., 31 Camden Rd, N.W.1.

"Thikbas" holloware—makers of? S.E.E.B.—Welsh Tinplate and Metal Stamping Co. Ltd., Cambrian Wks, Llanelly, Carmarthenshire.

Ash's Manufacturing Co. (Blackheath) Ltd.—address for? S.B.—This firm changed their name some years ago to: Gardiner and Gulland Ltd., Staplehurst Rd, S.E.13.

"Glendex" mercury switches and relays—makers of? E.P.A.—Glendex Co. Ltd., West Bank, Stamford Hill, N.16.

"Dallan" photographic apparatus—makers of? T.E.—David Allan (Dallan Products) Ltd., Mark Rd, Hemel Hempstead, Herts.

"Dry!me" tumbler dryers—makers of? G.H.—Wallisdown Electrical Appliances Ltd., Wallisdown Rd, Bournemouth, Hants.

"Angelus" radiators—address for? W.K.—Sperryn and Co. Ltd., Moorsom St, Birmingham 6.

"Norvac" vacuum cleaners—makers of? T.W.B.—Norvac Electrics Ltd., 186 Greengate, Manchester 3.

"Stotz-Kontakt" miniature circuit-breakers—agents for? G.E.E.—British Brown-Boveri Ltd., 75 Victoria St, S.W.1.

A614, Thorne Rd, Austerfield. Surveyor, Council Offices, Nether Hall.

23 Sept.—Belper U.D.C. Supply/erection/wiring on fixed-price basis of 30 140 W sodium lighting units on pre-stressed concrete columns along A6, Derby Rd, Milford. Engineer and Surveyor, Council Offices, King St.

25 Sept.—Belfast. Electrical installation in new residential Club for Seamen, Garmoyle St, for Society of St. Vincent de Paul. Details from C. P. McNally, 143 Royal Ave, Belfast. Deposit £3 3s.

25 Sept.—East Devon Water Board. Contract S.2. Duplicate pumps/equipment for Holyford Wks. Chief Engineer, 46 New St, Honiton.

25 Sept.—Esher U.D.C. Provision and erection of 27 25 ft steel columns/brackets/sodium lamps/gear, etc., along A3. Engineer, Surveyor and Planning Officer, Council Offices. Deposit £1 1s.

25 Sept.—Flintshire C.C. (a) Supply and laying of cable and (b) advanced direction signs, etc., for Queensferry By-pass lighting scheme. County Surveyor, Llwynegrin, Mold.

25 Sept.—Gravesend B.C. Electrical improvements in 955 houses on Westcourt, Northcourt and King's Farm estates. Engineer and Surveyor, Woodville Terr.

25 Sept.—Lytham St. Annes B.C. Nine new concrete columns, 85 c.i. columns, repositioning of 25 c.i. columns and renewal of 42 c.i. brackets on existing columns.—See 31 Aug. issue.

29 Sept.—Cheshire C.C. Applications invited for inclusion in select list for: (f) electrical installations. County Architect, E. Taberner, County Hall, Chester.

2 Oct.—Inverarie B.C. Supply and erection of lighting columns, resiting work and conversion to sodium lighting along A96. Burgh Surveyor, R. M. Bruce, Town Hse.

2 Oct.—Neath R.D.C. Supply and erection of 37 15 ft concrete columns/60 W sodium lamps / lanterns / gear / wiring along B4434, Tonna. Engineer and Surveyor, J. T. Jones, 18 Orchard St, Neath. Deposit £2 2s.

4 Oct.—Stockport B.C. (1) Rewiring of Weights and Measures Office and associated buildings, Castle Yd, Market Place. Borough Architect, Town Hall.

12 Oct.—Northwich R.D.C. Supply and installation of 38 30 ft concrete columns/200 W sodium lamps/lanterns/gear along A.49 at Cuddington. Engineer and Surveyor, Whitehall, Hartford, Northwich. Deposit £2 2s.

No date stated—N. of Scotland H.E.B. Supply of 16·5 MVA 132/11 kV transformer and auxiliary transformer for Nant Power Station.—Advertised 17 Aug. issue.

No date stated—N. of Scotland Three-mile 132 kV single-circuit steel lower line in Argyll.—Advertised 31 Aug. issue.

No date stated—S. Manchester Hospitals. Applications invited for inclusion in select list for electrical work and for the supply of cables, fittings, lamps and tubes.—See 31 Aug. issue.

. . . and Overseas

*Details of items marked * may be obtained on application to the Board of Trade, Lacon Hse, Theobalds Rd, W.C.1, quoting reference.*

18 Sept.—Nigeria. 540 3-ph. 50 A meters. Secretary, E.C. of Nigeria, Private Mail Bag 2030, 13 Broad St, Lagos. B.o.T. (ESB/27324/61).*

18 Sept.—Pakistan. Insulators (seven items). Director of Purchase, East W.A.P.D.A., D.I.T. Bldg, Dacca. B.o.T. (ESB/27399/61).*

20 Sept.—Burma. 250 V eight-way 15 A distribution boards, 5 A knife switches and 10 A tumbler switches. Director-General, Purchase Board, St. John's Rd, Rangoon. B.o.T. (ESB/27668/61).*

20 Sept.—Burma. Two 60 h.p. hand-operated auto-transformer starters. Director-General, Purchase Board, St. John's Rd, Rangoon. B.o.T. (ESB/27670/61).*

21 Sept.—America. One 15 MVA 3-ph. outdoor tap-changing transformer. Bureau of Reclamation, Bldg 53, Denver Federal Center. B.o.T. (ESB/27364/61).*

21 Sept.—India. Pulse generator for Atomic Energy Establishment, Trombay. Purchase Office, Mohatta Bldg, Palton Rd, Bombay 1. B.o.T. (ESB/27647/61).*

25 Sept.—Australia. 530 time switches. Secretary, H.E. Commission of Tasmania, Elizabeth St, Hobart. B.o.T. (ESB/27618/61).*

25 Sept.—S. Africa. Two 100 kW standby diesel alternators for S.A.B.C. transmitting station at Paradys, Bloemfontein. Chief Engineer, Kariba Hse, 164 Commissioner St, Johannesburg. B.o.T. (ESB/27683/61).*

30 Sept—Pakistan. Accessories for a.c.s.r. lines. Executive Engineer, Stores Division, Electricity, W.A.P.D.A., Bharat Bldg, Lahore. B.o.T. (ESB/27368/61).*

2 Oct.—Pakistan. All aluminium, and with a closing date of 3 Oct., a.c.s.r. conductors. Executive Engineer, W.A.P.D.A., Bharat Bldg, Lahore. B.o.T. (ESB/27369 and 70/61).*

13 Oct.—New Zealand. Four 12 MVA 3-ph. on-load tap-changing transformers with automatic control. Chairman, Auckland E.P.B., Queen St, Auckland. B.o.T. (ESB/27396/61).*

6 Nov.—Iran. 2,500 kW diesel generator. Bongah Bargh Shiraz, Shiraz. B.o.T. (ESB/27659/61).*

27 Dec.—India. 125/140 MW turbo-generators and boilers for Durgapur and/or Chandrapura Power Station/Stations. Controller of Purchase and Stores, D.V.C., Anderson Hse, Alipore, Calcutta 27. B.o.T. (ESB/27394/61).*

CONTRACTS PLACED

Ilford B.C. Installation of stage 4 street lighting, Midland Electrical Contractors Ltd., £27,452. Recommended.

Stockport B.C. Electrical work in phase II of College of Further Education, Piggott and Whitfield Ltd., £38,316.

Stoke-on-Trent C.C. Lighting of public abattoir, Barnett and Soans Ltd., £2,980. Recommended.

Gazette Announcements

COMPANIES ACTS

Domestic Refrigeration Co. Ltd. Petition for winding-up to be heard before the High Court of Justice, Strand, W.C.2, on 9 Oct. Persons intending to appear to notify A. W. Coleman and Allibone, 20 Kingsway, W.C.2, by 4 p.m., 6 Oct.

Rowyn Ltd. Petition for winding-up to be heard before the High Court of Justice, Strand, W.C.2, on 9 Oct. Persons intending to appear to notify Cochrane and Cripwell, 119 Finsbury Pavement, E.C.2, by 4 p.m., 6 Oct.

J. Rowell and Son Ltd. Mr N. Dunn, 24 Windsor Terr, Newcastle upon Tyne 2, appointed liquidator at extraordinary general meeting on 28 June for the purpose of voluntarily winding-up.

BANKRUPTCY ACTS

Receiving Order

Cardiff. P. R. Morrison and G. D. J. Williams, electrical appliance retailers, formerly carrying on business in partnership as P.G. Electrics at 17 Winston Sq, Colcot, Barry, and 50 Queenshill, Newport. Receiving order dated 23 Aug.

Public Examinations

Cardiff. P. R. Morrison and G. D. J. Williams, electrical appliance retailers, formerly carrying on business in partnership as P.G. Electrics at 17 Winston Sq, Colcot, Barry, and 50 Queenshill, Newport. Public examination: 10.30 a.m., 13 Oct., at County Court, Westgate St, Cardiff.

Coventry. R. Guise, electrical contractor, formerly carrying on business as Keresley Electrical Service, at 12 Bantam Grove, Keresley. Public examination: 11.15 a.m., 30 Oct., at County Hall, Coventry.

Sheffield. J. T. Barnes, electrical appliance dealer, formerly carrying on business at 153-155 Marshland Rd, Moorends, Thorne. Public examination: 2 p.m., 16 Nov., at County Court Hall, Bank St, Sheffield 1.

Intended Dividends

Brighton. A. E. and S. J. Dalmon, sanitary and electrical engineers, formerly carrying on business as P. Daimon and Sons at 60 Teville Rd, Worthing. Last day for receiving proofs for intended dividend: 11 Sept., by trustee: T. H. Parker, 8 Old Steine, Brighton.

Hanley and Stoke-on-Trent. E. C. Johnson and J. A. Sheward, electrical contractors, formerly carrying on business in partnership as Edstan Electric at 20 Market St, Hanley, and 40 London Rd, Newcastle under Lyme. Last day for receiving proofs for intended dividend: 8 Sept., by trustee: W. H. Meredith, 12 Lonsdale St, Stoke-on-Trent.

TRADE NOTES

Changes of Address. Headquarters of the Department of Scientific and Industrial Research have now moved to State Hse, High Holborn, W.C.1. Telephone: Chancery 1262.

The Nottingham office of A.E.I. Lamp and Lighting Co. has moved to Ashforth St, Alfred St Central, Nottingham. The telephone number remains 51115.

Lloyd Instruments Ltd. are moving to Furrow La, Homerton High St, E.9. Telephone: Amherst 6578.

T. W. Broadbent Ltd. have moved to Victoria Electrical Wks, 4 Queensgate, Huddersfield. Telephone: Huddersfield 5371.

The London depot of the Metallic Seamless Tube Co. at 86-88 Goswell Rd, E.C.1, has been extended to include a new trade counter and larger stocks.

Agency. G.E.C. Ltd. and Storno-Southern Ltd., of Camberley, have made arrangements whereby the latter concern has this week taken over responsibilities for marketing, servicing and installing G.E.C. mobile radio equipment. Storno-Southern already have sales and service facilities and a spares depot at 2 Arbury Ave, Coventry. G.E.C. will continue to manufacture their range of communication equipment on a contract basis.

New Depot. British Insulated Callender's Cables Ltd. have opened a new depot at 37 Broad St, Coventry. Telephone: Coventry 89600.

Expansion. H. Frost and Co. Ltd., Walsall, have now completed a new large factory extension to cope with orders for their fires.

Extensive alterations are being carried out at the Nottingham branch of Arco Rewinds, at 203 Queen's Rd, Beeston.

Teddington Autocontrols Ltd. have taken over a new 33,500 sq ft factory on the Sunbury-on-Thames site.

The Plessey Co. has leased another factory of 50,000 sq ft from Swindon Corporation.

Ericsson Telephones Ltd. is to have a 46,000 sq ft extension to its Sunderland factory.

Licensing. Wayne Kerr Laboratories Ltd. have obtained sole U.K. marketing and manufacturing rights for Gertsch electronic instruments.

Distributors. Tung-Sol Electric Inc., New Jersey, U.S.A., have appointed Walmore Electronics Ltd., 11-15 Betterton St, W.C.2, as distributors in the U.K. for their valves and semiconductor products.

Change of Name. The title of the Visco Engineering Co. Ltd. has been changed to Visco Ltd.

BUSINESS PROSPECTS

Amersham. £275,000 contract placed by the U.K.A.E.A. with W. and C. French Ltd., Buckhurst Hill, for laboratory/ancillary buildings, Radio Chemical Centre.

Andover. Proposed by Omasgrand Property Co. Ltd., 177 dwellings, Barlows La, and 39 dwellings, Winchester Rd.

Antrim. Tender: 196 dwellings, Crumlin Rd; N. Ireland Housing Trust Ltd., 12 Hope St, Belfast 12.

Aylesbury. Proposed: rebuilding factory of Nestlé Co. Ltd., High St; architects: J. Stanley Beard, Bennett and Wilkins, 101 Baker St, W.1; cost: £250,000.

Barnsley. J. Thorpe and Sons Ltd., 28 Meadowhead Drive, Sheffield 8, propose 72 dwellings off Burton Rd.

Basildon. Contract for £150,000 factory for Spong and Co. Ltd. placed with W. and C. French Ltd., New Epping Rd, Buckhurst Hill, Essex.

Bingley. 41 houses at Cottingley proposed by Daisy Hill Properties Ltd.

Birmingham. 13-storey shop/offices, Edgbaston, proposed for Murrayfield Real Estate Co.; contractors: Tersons Ltd., Dollis Park, Finchley, N.3.

Bracknell. Proposed: oil testing laboratory/offices at Bullbrook for Castrol Ltd., Marylebone Rd, N.W.1.

Brightlingsea. Planned: 55 bungalows and chalets, New Maltings, Church Rd, for North East Essex Buildings Co., 3 Sydney St.

Chatham. Chailer and Lavender, architects, 1 Lincoln's Inn Fields, W.C.2, propose development of land, Coal Bottom.

Cheltenham. Proposed: 75 dwellings at Arle Gdns, Arle Rd, for Dare (Stratford) Ltd., 8 Union St, Stratford. Proposed: building, 58,000 sq ft, Alston La, for Gloucestershire Marketing Soc. Ltd., Market St.

Chester-le-Street. Matkin and Hawkins, Barclays Bank Chmbrs, Fawcett St, Sunderland, architects for proposed Highway Hotels Ltd. £100,000 motel, Birtley.

Christchurch. Three blocks each of 24 flats proposed, Stour Rd, by Tucton Investments Ltd.

Croydon B.C. Tender: 74 dwellings, Stroud Green Way, Ashburton; Engineer.

Dewsbury. Planned by Haywood and Peirson Ltd., 28 Bennett La, 20 houses, Chidswell La.

Doncaster. B.C. propose £2,000 electrical work and structural alterations to 104 prefabs, Broomhouse La estate.

Dover. Factory, Lorne Rd, proposed for E. M. Gheysens Ltd., Buckland Bridge.

Downham. Barker Bros., 84 Bexwell Rd, propose 30 houses at Downham.

Dudley C.B.C. Tender: 272 dwellings, Russells Hall estate; Architect.

Dunbarton. C.C. propose shops, Old Kilpatrick; Co. Clerk, Dumbarton.

Edinburgh C.C. Tender: all trades, bus depot, Marine Gdns, Portobello, including electrical work; applications to Transport Manager by 4 Sept. Tender: all trades, new police station, Gayfield Sq, including electrical work; applications to City Architect by 11 Sept. Tender: all trades, 205 dwellings, Leith Fort development; City Architect.

Fareham. E. J. Thomas, Jolly and Grant, 26 Kent Rd, Southsea, architects for new factory on R.A.F. station site, Titchfield, for Plessey Co. Ltd., Vicarage La, Ilford.

Fifeshire. Proposed: heavy fabrication shop to cost £100,000 at Mountflevie, Leven, for H. Balfour and Co., Leven.

Glasgow. Planned: 11-storey flats, 12 Clivedon Rd, etc., for Copthall Hldgs Ltd., 3 Red Pl, Mayfair, W.1. C.C. recommended to award £1,214,200 contract to Heenan and Froude Ltd., Worcester, for reconstruction of Govan refuse works.

Gloucester. C.C. propose £172,398 extensions to Hartbury Farm Institute.

Hastings. A. C. Draycott, South St, Lancing, propose 58 dwellings at Filsham Rd estate.

Heathrow. Planned: catering and cabin services building, London Airport; architects: Clive Pascall and Peter Watson, 24 Half Moon St, W.1. Proposed: north office block and V.I.P. suite, Central Terminal Area, London Airport; architect: Frederick Gibberd, 8 Percy St, W.1.

Hemel Hempstead. B.C. propose £266,000 town centre pavilion for dancing, etc.

Heston and Isleworth B.C. Tender: 68 dwellings, Whitton Dene/Hall Rd; surveyor, 88 Lampton Rd, Hounslow.

Hoddesdon. Proposed: £90,000 factory for Morley's (Birmingham) Ltd.; contractors: C. L. Nye Ltd., Caxton Wks, Cranbourne Rd, Potters Bar, Middx.

Hornchurch. Stanhope Securities Ltd. plan 178 dwellings at Abbscross La; architects: Thompson and Whitehead, 35 Eastern Rd, Romford; cost: £500,000.

Howden R.D.C. Tender: Bubwith and Foggathorpe sewerage scheme including pumping equipment; engineers: J. H. Haiste and Ptnrs., 20 Wood La, Headingley.

Hunts. C.C. propose new junior school, Spring Common, Huntingdon; County Architect, Huntingdon.

Kirk Sandall. Pilkington Bros. Ltd. propose new office block and stores extensions to Kirk Sandall (Yorks) factory.

Lancashire. R.C. secondary school planned on 14-acre site, Damfield La, Maghull.

Leeds. Regional Hospital Board tender: new ward block, Bempton La Hospital, Bridlington; Board architect, Park Parade, Harrogate.

Leicester. E. Alec Coleman Group propose two-storey department store with offices over, Garnby St; cost: £100,000; architect: Owen Luder, Regency St, S.W.1.

Letterkenny U.D.C. Tender: 37 houses, Ballyboe/Glencar; architect: C. V. McLaughlin, Letterkenny, Co. Donegal.

Limerick. Tender: new factory, Dock Rd; quantity surveyors: D. O'Reilly, Hyland and Co., 65 O'Connell St.

Liverpool. £115,000 contract placed by Industrial Estates Management Corp. at Speke No. 2 factory for Standard-Triumph (Liverpool) Ltd.; contractors: Leyland Construction Co. Ltd., Leyland.

London. Concord Investments Ltd. have placed contract for flats, Finchley Rd, N.W., with Holland & Hannen and Cubitts (G.B.) Ltd., 1 Queen Anne's Gate, S.W.1; cost: £280,000. Planned: 60 flats, Belmont Park, S.E., by Huckle and Durkin, architects. Research Laboratories to cost £25,000 proposed, North Circular Rd, N.W.10, for British Oxygen Co. Ltd; contractors: Geo. Wimpey and Co. Ltd., Hammersmith Gro, W.6. C.C. proposes extensions to cost £175,000 at North Hse, Putney, S.W.; architects: George Fairweather and Ptnrs., 28-30 Wigmore St, W.1. Special schools proposed at Barons Court, W., and Clissold Rd, Stoke Newington; £124,280. R. Fielding, Aldwych Hse, W.C.2, architect for ten-storey offices/warehouse at Borough High St, S.E.1. Proposed: extension to B.O.A.C. air terminal, Buckingham Palace Rd, S.W.1; cost: about £1 million; architects: T. P. Bennett and Son, 43 Bloomsbury Sq, W.C.1.

Loughborough. The East Midlands Gas Board, University Rd, Leicester, propose showrooms/offices, Market Pl.

Luton. Planned: 55 dwellings, Icknield Nursery, Limbury Rd, for Pearce and Barker Ltd., 71 Leagrave Rd.

Maidstone. Planned: ten shops, 52 dwellings, Poplar Grove, for Camley Garden Estate Ltd; 56 maisonnettes in 14 blocks, Sandling La, for Amalfi Properties Ltd.

Manchester C.C. Tender: 281 dwellings, Chapel La, Hadfield; Director of Housing.

Middlesbrough. Planned: 78 bungalows at Acklam Rd for Premier Dwellings Ltd., 157 Albert Rd; architects: Garbutt, Archibald and Archibald, 23 Albert Rd.

Millom. Proposed: 80 houses off Dumb La, for North Lancs and South Cumberland Development Co. Ltd., St. George's Terr.

Morley. Proposed: 42 dwellings, Main St/Moor Knoll La, East Ardsley, for H. Waterhouse and Sons, East Ardsley.

Newbury. B.C. propose modernisation of existing houses including installation of electric water storage heaters in 107 houses, Monks La, Camp Close; Surveyor.

Ottery St. Mary. New factory, Yonder St, planned for Mec Test-McCabe Communications, Tale Hse, Payhembury, Honiton.

Oxford. Proposed: 18 old people's flats, 76 flats at Temple Rd/Salegate La, for Silk's Estate Development Ltd., 101 Cowley Rd.

Pershore. Worcs C.C. propose £80,000 students' hostel at Pershore Institute.

Peterborough. Proposed: Broadway-Midgate redevelopment, scheme consists of large shopping block and arcade to cost £800,000; promoters: Oddenino's Property and Investment Co. Ltd.; architects: Douglas Stephen and Ptnr., 30b Wimpole St, W.1.

Plymouth. Luxury hotel, "The Mayflower," proposed at The Sound. Plans for 17-storey tower block and a two-storey block containing a conference hall; cost: £900,000; architects: Vincent Burr and Ptnrs., Gower St, W.C.1.

Poole. The Wessex Regional Hospital Board, Winchester, plan stage 2 of the General Hospital development.

Reading. Proposed by McManus and Co. Ltd., Woodlands Rd, Oxford, 21 flats and 77 dwellings, off New Lane Hill; 38 houses off Park La, Tilehurst, proposed by R. J. Haddock Ltd., 65 Castle St, Reading.

Scarborough. The Air Ministry propose 158 houses at Castle Park estate, Whitby, for Ministry personnel.

Southend. Eron Investments Ltd. plan shops/offices/banqueting hall, High St; architects: Fitzroy Robinson and Ptnrs., 3 Gray's Inn Sq, W.C.1.

St. Austell. Shopping precinct, New Town centre, planned by Copthall Hldgs, 3 Red Pl, W.1.: 40 shops, a supermarket, offices, flats/hotel, proposed; architects: Alister McDonald and Ptnrs., 10 Bedford St, W.C.2.

St. Helens. Proposed: two factories, Parr, for Delta Metal Co.; cost: £150,000; contractors: Robert M. Douglas (Contractors) Ltd., 395, George Rd, Birmingham 23.

Stockport B.C. Tenders: 49 aged persons' flats, various sites; Architect.

Stockton. Proposed by Appleton and Hall, 134 High St, housing developments on about 100 acres of land near Junction Rd and Darlington La, Norton.

Sutton and Cheam. Proposed: 55 flats, maisonnettes, 112-116 Brighton Rd, for Geo. Wimpey and Co. Ltd., Hammersmith Gro, W.6.

Swansea. £480,000 contract placed by British Hydrocarbon Chemicals Ltd., Devonshire Hse, Mayfair Pl, W.1, for new factory, Baglan Bay; contractors: Turriff Construction Corp. Ltd., of Warwick.

Tewkesbury. Glos C.C. propose rewiring of Walton Hse nursery to cost £1,250.

Tynemouth. R. Sleightholme Ltd., builders, St. Oswyn Pl, Tynemouth, propose houses on about 4¼ acres, Moorhouses estate, North Shields.

Walton. Stewart Ferguson and Ptnrs., architects, 13 Priory Ave, W.4, architects for 25-storey block of 75 flats at Hall La, for Denbrick Investments Ltd.; cost: £350,000.

Welling. Shopping centre on site of Embassy ballrooms proposed by J. Stevens (Builders) Ltd., Marwood Close.

West Bromwich. Proposed: 361 houses and eight maisonnettes at Bustleholme Mill, for Jones, Mackay and Croxford, estate agents, 79 Edmund St, Birmingham 3.

West Suffolk. C.C. Health Committee (Bury St. Edmunds) plan aged persons' homes at Haverhill and Bury St. Edmunds, to cost £53,000 each.

Whitby. U.D.C. propose 18 houses, Spital Bridge. Architect: J. Houghton, 9 Skinner St.

Wigan. Proposed by Howard Estates Ltd., 9 Queen's Rd, Southport, 44 bungalows, The Common, Parbold. R.D.C. tender: Parbold and district sewerage scheme including pumping equipment for two small

Business Prospects—continued

stations; engineers: C. J. Lomax and Son, 63 Barton Arcade, Deansgate, Manchester 3.

Willenhall. J. F. Phillips and Asscts., 36 New St, West Bromwich, architects for £100,000 new Ductile Steel Group offices.

Wiltshire. C.C. plans to adapt Salisbury Isolation Hospital as training centre and hostel for sub-normal persons; cost: £85,000; County Architect, Trowbridge. Propose welfare home for 50 at Chippenham; cost: £78,500; and home for blind on mid-west county site; £68,000.

Winchester. Shops and offices are planned for Harman and Co. Architects: C. W. T. Evans, Wolvesey Palace, College St.

Wishaw. Bairds Ltd., Wishaw, propose three-storey departmental store to cost £100,000, at Main St.

Woking. New factory, Eastheath industrial estate, proposed for Metalair Ltd. The Prison Commissioners, Horseferry Rd, S.W.1, propose detention centre, Send, to cost £60,000.

Woldingham. Extensions proposed at Convent of the Sacred Heart. Architects: T. Mitchell and Ptnrs., 20 Bedford Sq, W.C.1.

Worcester C.C. Tender: 155 dwellings, Warndon estate. City Engineer.

Worcestershire. C.C. propose £100,000 teaching farm.

Wrotham. Proposed by Croudace Ltd., 97 Godstone Rd, Caterham, a Trosley Woodland Village on 155 acres of North Downs at Trosley Towers. About 2,500 people would be accommodated.

Yeovil. The Wessex Estates Co. Ltd. propose 300 dwellings; contractors: Roger Malcolm Ltd., Malcolm Hse, Empire Way, Wembley.

York. Model village, known as Woodthorpe, Moor La area, proposed by Shepherd Homes of York, Blue Bridge La, York; about 900 houses/shops/public buildings on 100-acre site. Planned: 78 houses, The Roughs, Dringhouses, for Shepherd Developments (Northern) Ltd., Blue Bridge La, York.

MEETINGS TO NOTE

THURSDAY, 7 SEPT.

A.S.E.E. (Brighton, Hove and District). "Modern Trends in Coil Winding Wire," C. P. Fox, Cricketers Hotel, Black Lion St, Brighton 1. 7.30 p.m.

FRIDAY, 8 SEPT.

Society of Instrument Technology (Midlands). "Forum on Instrument Maintenance." Lecture Theatre, Byng Kendrick Suite, Gosta Green College of Technology, Aston St, Birmingham. 7 p.m.

MONDAY, 11 SEPT.

A.S.E.E. (Bolton). "Automatic Control Equipment for Small and Medium Oil-burners," L. G. Barnfield. Railway Hotel, Trinity St. 7.45 p.m.

A.S.E.E. (N.W. London). Discussion: "Home Heating Problems." Century Hotel, Wembley. 8.15 p.m.

A.S.E.E. (Central London). "History and Working of the Stock Exchange," C. H. Dreyfus. White Hall Hotel, Bloomsbury Sq, W.C.1. 7.15 p.m.

TUESDAY, 12 SEPT.

A.S.E.E. (Aldershot and District). "Swedish Supply and Hot-Line Working," A. Flude. Queens Hotel, Farnborough. 8 p.m.

A.S.E.E. (Gloucester and District). "The Panelec Warming System." Royal Hotel, Station Rd. 8 p.m.

A.S.E.E. (Leicester). Chairman's address, Westcotes Constitutional Club, 124 Wilberforce Rd. 7.30 p.m.

WEDNESDAY, 13 SEPT.

A.S.E.E. (Birmingham). "Diesel-electric Propulsion for Trains," J. L. Aspland, Eng. and Bldg. Centre, Stephenson Pl, Birmingham 2. 7.30 p.m.

A.S.E.E. (East Anglia). "The Protection of Electrical Installations," J. A. Robbins. Red Lion Hotel, Thetford. 7.30 p.m.

A.S.E.E. (Luton). "A Short History of the A.S.E.E.," W. J. Wheeler, and film, "120,000 kW Under the Sea." 8.15 p.m.

A.S.E.E. (Wolverhampton and District). "Static Switching Control Systems," B. A. W. Midgley. Chamber of Commerce, District Bank Chambers, Lichfield St. 7.45 p.m.

Society of Instrument Technology (East Midlands). One day conference, "The Application of Instrumentation to Industrial Processes." Loughborough College. 9.30 a.m.

THURSDAY, 14 SEPT.

Institution of Mechanical Engineers (Eastern Branch). (Lubrication and Wear Group) "Lubricants in Nuclear Reactors," P. E. B. Vaile. Social Club of Hoffmann Manufacturing Co. Ltd., Chelmsford. 7.30 p.m.

A.S.E.E. (Bradford). "Lighting in Home and Industry," J. W. Howell. Midland Hotel. 7.30 p.m.

A.S.E.E. (Nottingham). Chairman's address, People's College of Further Education, Castle Rd. 7.30 p.m.

A.S.E.E. (S.W. London). "Unearthing London," Norman Cook. Prince of Wales Hotel, S.W.19. 8 p.m.

Society of Instrument Technology (Liverpool). Chairman's address, "Instruments in the Phosphate Industry," D. G. Tate, M.A.N.W.E.B. Industrial Centre, Paradise St. 7 p.m.

Institution of Plant Engineers (Glasgow). "Electronic Control of Machine Tools and Production Plant." Scottish Bldg. Centre, 425 Sauchiehall St, Glasgow C.2. 7.15 p.m.

FRIDAY, 15 SEPT.

A.S.E.E. (Stoke and Crewe). "Electronic Controls and Photo-electric Equipment," G. I. G. Ive. Grand Hotel, Hanley. 7.30 p.m.

MONDAY, 18 SEPT.

Society of Instrument Technology (Bristol). "Telemetry Installation in Bluebird, 1960," A. Potten, Dept. of Physics, University of Bristol, The Royal Fort. 7.30 p.m.

THURSDAY, 21 SEPT.

Society of Instrument Technology (Grangemouth). "Theoretical Aspects of Control Engineering," J. M. Keating. Leapark Hotel, Bo'ness Rd. 7 p.m.

MONDAY, 25 SEPT.

Institution of Plant Engineers (W. and E. Yorks). "The Construction of Bradwell Heat Exchangers," J. Shaw and G. Cain. Houldsworth School of Applied Science, Leeds University. 7.30 p.m.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Auxilec. 809,209. Class 7. Machines for use in the preparation of foods, etc. 809,210. Class 9. Apparatus, etc. 809,211. Class 11. Installations for lighting, etc. Auxilec, Auxiliaries Electro-Mecaniques de Precision.

Circulume. 819,411. Class 9. Condensers, starter switches, etc. Circulume Ltd., 6 Tariff St, Manchester 1.

Durite. 815,936. Class 9. Apparatus, etc. Gordon Equipment Ltd., 14-18 King's Pl, Buckhurst Hill, Essex.

E.E. in design. B809,524. Class 7. Motors, controls, etc. Emerson Electric Mnfg. Co., St. Louis, Missouri, U.S.A.

Mecpot. 820,378. Class 9. Trimmer potentiometers, etc. Miniature Electronic Components Ltd., Henrietta Hse, Henrietta Pl, W.1.

Quantimetre. 820,391. Class 9. Apparatus for indicating and controlling the level of liquid or solid materials in a container. Lancashire Dynamo E.P. Ltd., B.E.P. Wks, Brereton Rd, Rugeley, Staffs.

Portacon. 815,528. Class 11. Airfield lighting installations, etc. British Insulated Callender's Cables Ltd., Norfolk Hse, Norfolk St, W.C.2.

Rotolier. 821,063. Class 11. Lighting fittings, etc. Rotaflex (Gt. Britain) Ltd., 4-10 Nile St, N.1.

Sicodyne. 820,393. Class 9. Control apparatus, incorporating silicon controlled rectifiers, etc. Lancashire Dynamo E.P. Ltd., B.E.P. Wks, Brereton Rd, Rugeley, Staffs.

Super K Ceramicon. 817,900. Class 9. Ceramic condensers. Erie Resistor Ltd., Millora Wks, Beevor Rd, South Denes, Gt. Yarmouth.

Tesamaster. 811,747. Class 9. Instruments, etc. Tesa S.A., 12 Rue de la Savonnerie, Renens, Vaud, Switzerland.

Twy-nair. 797,181. Class 11. Air conditioning and ventilating installations, etc. Carrier Eng. Co. Ltd., 24 Buckingham Gate, S.W.1.

Unistat. 816,415. Class 9. Apparatus, etc. English Electric Co. Ltd., English Electric Hse, Strand, W.C.2.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons Ltd., 116 Chancery La, W.C.2.

Brimar Ltd., Stafford Hse, Norfolk St, W.C.2. Manufacturers of and dealers in goods of all kinds in connection with wireless telegraphy, telephony and television, etc. Nom. cap.: £100. Dirs.: to be appointed by subs. Subs.: Cecil A. Worthington and Nigel N. G. Maw.

Delta Electrical Co. (Enfield) Ltd., 86 Halifax Rd, Enfield, Middx. To take over the business of Joseph D. Darville carried on at 153e Baker St, Enfield, as "Delta Electrical Company," etc. Nom. cap.: £1,000. Dirs.: Joseph G. Darville and Mrs Florence Darville.

D. W. A. Blades Ltd., 48 Windmill St, Gravesend, Kent. Electrical contractors, etc. Nom. cap.: £100. Dirs.: David W. A. Blades and Constance R. Blades.

F. Fisher Ltd., 12 Station Rd, Keele, Staffs. Electricians, etc. Nom. cap.: £1,000. Dirs.: Frederick Fisher, Dora Fisher and Boyce M. Fisher.

Haydn Williams Ltd., 28 Longridge Ave, Saltdean, Sussex. Electrical engineers, etc. Nom. cap.: £100. Dirs.: Haydn C. Williams and Mrs Rita J. Williams.

K. N. Slatter Ltd., 84 The Broadway, Chesham, Bucks. Electrical engineers, etc. Nom. cap.: £5,000. Dirs.: Keith N. Slatter and Mrs W. A. Slatter.

Milady Electrical Appliances Ltd., 186 Greengate, Salford 3. Nom. cap.: £1,000. Dirs.: Harry Morris, Ivan Morris and Leonard D. Morris.

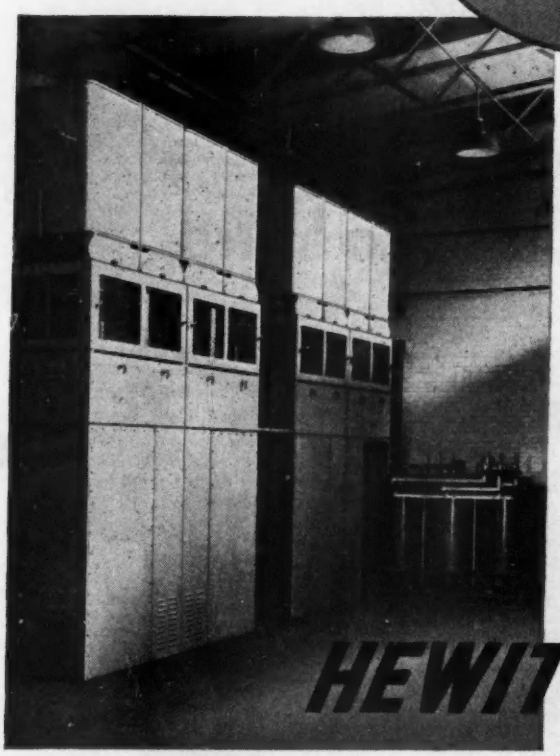
N. Goswell Ltd., 8 The Crescent, Minories, E.C.3. Manufacturers of and dealers in electrical goods, etc. Nom. cap.: £100. Dir.: Leonard A. Watson.

Postings Bros. Ltd., Union St, Horseley Fields, Wolverhampton. To take over the business of electrical engineers and contractors carried on as "C. A. and W. J. Postings" at Horseley Fields and at Broad St. in Wolverhampton, etc., Nom. cap.: £10,000. Permanent dirs.: Charles A. Postings and William J. Postings.

P. G. Tyrer (Hastings) Ltd., Turberville Hse, Seven Dials, Brighton. Diesel fuel injection and electrical specialists, etc. Nom. cap.: £8,000. Dirs.: Philip G. Tyrer and Norman Yates.

S.G.T. Electrics (Lancing) Ltd., Commerce Chmbrs, Commerce Hse, South St, Lancing, Sussex. Nom. cap.: £200. Dirs.: Reginald E. Petitt, Mrs Daisy Monnery, Peter R. Thurston and Albert W. Evans.

Vero Electronics Ltd. To take over business of manufacturers of electronic equipment carried on by Vero Precision Engineering Ltd., at South Mill Rd, Southampton, being part of the assets and undertaking of that company, etc. Nom. cap.: £100. Dirs.: Geoffrey Verdon-Roe, Great Brook, Warsash; Colin K. Dowman, Trevisome Hse, New Milton; and Royce M. Verdon-Roe.



THE LARGEST SUBSTATION ON LONDON TRANSPORT RAILWAYS

The Hackbridge and Hewittic Electric Company is responsible for the supply of 9,000 kW of rectifier and enclosed air-blast-cooled transformer equipments together with associated A.C. and D.C. control gear at Charing Cross substation feeding the District, Bakerloo and Northern lines. This substation is designed for an ultimate capacity of 12,000 kW.

The photograph, left, shows two 1,500 kW equipments. One of the two main transformers in the farther set is withdrawn to show its location.

equipped exclusively with

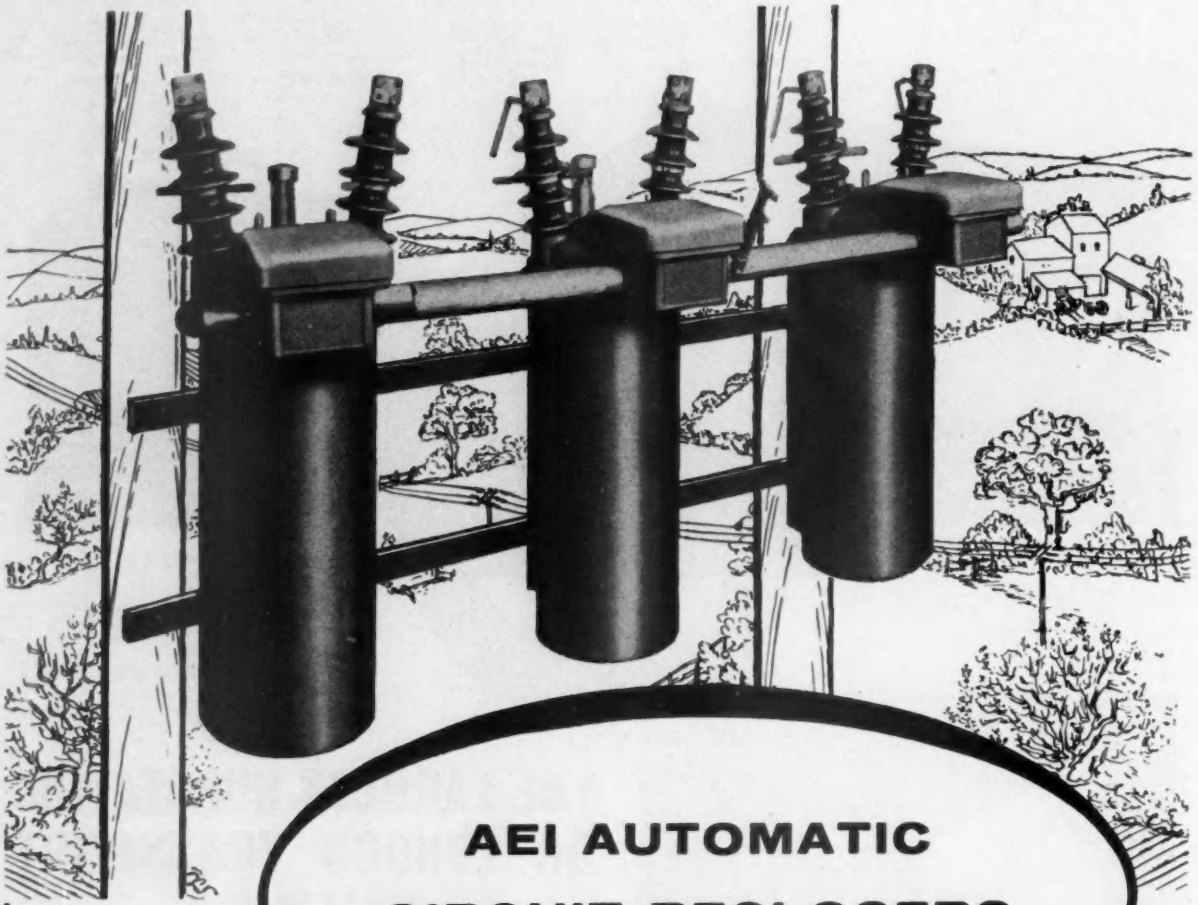
HEWITTIC RECTIFIERS

HACKBRIDGE AND HEWITTIC ELECTRIC Co. Ltd.

HERSHAM, WALTON-ON-THAMES, SURREY

Telephone : Walton-on-Thames 28833 (8 lines) **Telegrams and Cables : Electric Walton-on-Thames**

. . . Keep supply lines clear



AEI AUTOMATIC CIRCUIT-RECLOSERS

PERFORMANCE DETAILS

SUPPLY: *Up to* 11-*kV*

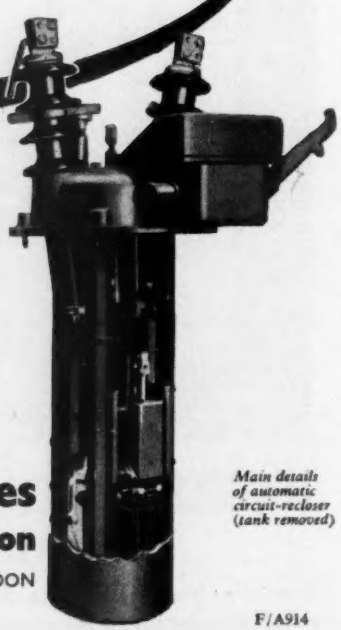
BREAKING CAPACITY: *Up to 75 MVA*

CURRENT RATING: 5 *to* 200 *amperes*

DUTY CYCLE: 2 *instantaneous or* 2 *time-delayed trips, and* 4 *instantaneous trips*

Automatic Circuit-Reclosers Type RB from AEI prevent transient faults from causing lengthy supply interruptions on rural lines. Experience has also proved that on lines protected by these reclosers, the number of persistent faults is considerably reduced.

*For further details, write to AEI Switchgear Division, Willesden Works, Neasden Lane, London, N.W.*10 *or to your local AEI office.*



Main details of automatic circuit-recloser (tank removed)

AEI **Associated Electrical Industries**

Switchgear Division

TRAFFORD PARK, MANCHESTER · HIGHER OPENSHAW, MANCHESTER · WILLESDEN, LONDON

F/A914

CLASSIFIED ADVERTISEMENTS

APPOINTMENTS VACANT

CENTRAL ELECTRICITY GENERATING BOARD

Southern Project Group

DUNGENESS NUCLEAR POWER STATION

APPLICATIONS are invited from suitably qualified and experienced engineers for the post of

SECOND ASSISTANT ENGINEER

(MECHANICAL)

at Dungeness Nuclear Power Station Construction Site.

The successful candidate will be required to assist the Site Mechanical Engineer in the supervision of the installation and testing of mechanical engineering plant—conventional and nuclear. Experience in the supervision of construction of major engineering works and in the installation of power station plant would be an advantage.

The salary will be within Scale 15 of the National Joint Board Agreement, i.e., £1,460/£1,830 per annum, according to qualifications and experience.

The successful candidate will be required to live in the vicinity of the site for the duration of the construction work, which will be up to four to five years. Opportunities will be available for transfer to future construction sites and associated project teams.

Applications stating age, qualifications, experience, present position and salary should be forwarded to the Administrative Officer, Central Electricity Generating Board, Southern Project Group, Squires La, Finchley, London N.3, to arrive not later than Thursday, 21 Sept., 1961.

Envelopes should be marked "Confidential —Ref.: S/61/23."

T. YULE,
Chief Project Engineer.
(C 67)

CENTRAL ELECTRICITY GENERATING BOARD

North Eastern Region

SECOND ASSISTANT ENGINEER

(OPERATIONAL RESEARCH)

APPLICANTS are invited for the appointment in the Operational Research Department of the North Eastern Region of the Central Electricity Generating Board, Leeds.

The applicants should have good engineering qualifications, some experience in power station work and be capable of original and constructive thought.

The successful applicant will be required to continue the work of the department on the application of work study principles to the problem of the quick return to service of high merit units following overhaul. He will also, to a lesser extent, be required to co-operate in the work of the department on the application of operational research techniques to the Board's power stations.

The salary according to experience and qualifications will be within the range of £1,415/£1,720 per annum, National Joint Board Agreement, Grade 5, Class BX, Scale 14.

Forms of application may be obtained from the Assistant Regional Secretary (Personnel), Central Electricity Generating Board, North Eastern Region, 1 Whitehall Rd, Leeds 1, to whom they should be returned to arrive not later than 25 Sept., 1961. (C 58)

SOUTH EASTERN ELECTRICITY BOARD

DISTRICT SENIOR COMMERCIAL ASSISTANT

(SALES)

CENTRAL SUSSEX DISTRICT

SALARY £1,150/£1,240 per annum maximum on N.J.C.6. Superannuable. The successful applicant will be responsible for sales promotion and publicity, and the co-ordination of the four showrooms in the District. His duties will also include the control of showroom stock.

Applications quoting ET and naming two referees to District Manager, Seeboard, Electra Hse, Church Rd, Haywards Heath, Sussex, by 18 Sept., 1961.

ASSISTANT DISTRICT COMMERCIAL

ENGINEER

GUILDFORD

Salary £890 x £25—£1,015 per annum under N.J.B. Class F, Grade 9. Superannuable. Applicants should have had experience in commercial, industrial and domestic development. A good knowledge of heating installations including floor-warming is necessary.

Applications quoting ET on forms from District Manager, Seeboard, Woodbridge Rd, Guildford, Surrey, by 20 Sept., 1961.

FITTER (ELECTRICAL)

CRAWLEY AND HORSHAM DISTRICT

Wages 5s 6½d per hour for 42-hour 5-day week under N.J.I.C. Agreement. Applicants should be experienced in the erection and maintenance of H.V. and L.V. switchgear and transformers. Subject to certain conditions, housing accommodation may be available at Crawley.

Applications quoting ET and naming two referees to District Manager, Seeboard, 50/52 The Broadway, Crawley, Sussex, by 20 Sept., 1961.

SHOWROOM ASSISTANTS

CROYDON AND PURLEY DISTRICT

Annual salary including London Allowance £285 at 16, to £490 at 20, rising to £600, £680 or £740 according to qualifications obtained and ability. Duties will include general showroom work and the advising of consumers on the use of electrical apparatus. The successful applicants may be required to work in any showroom of the Croydon and Purley District. He may also be required to carry out cashier duties.

Applications quoting ET and naming two referees on forms from District Manager, Seeboard, Electric Hse, Wellesley Rd, Croydon, by 20 Sept., 1961.

DEMONSTRATOR (FEMALE)

CROYDON AND FURLEY DISTRICT

The duties will include conducting demonstrations, sales and advice to consumers on the selection and use of electrical appliances, both at the showrooms and on consumers' premises. Preference will be given to applicants holding the E.A.W. Electrical Housecraft Certificate. Annual salary within the range of £490 at age 21, rising to £605 or £740, including London Allowance, according to qualifications and ability.

Applications quoting ET and naming two referees on forms from District Manager, Seeboard, Electric Hse, Wellesley Rd, Croydon, by 20 Sept., 1961.

GEORGE WRAY,
Secretary.
(C 61)

CENTRAL ELECTRICITY GENERATING BOARD

South Thames Division

ENGINEER

ELECTRICAL ENGINEER'S DEPARTMENT

Vacancy No. 236/61.

REQUIRED to join a District team engaged in commissioning major electrical plant, and maintaining associated automatic protective and control gear in generating stations and transforming substations. This work will be in Kent or Surrey or East Sussex, but the successful candidate will be based in the first instance at Divisional Headquarters, Kingston upon Thames.

This post offers good career prospects in an interesting field to recently qualified or other engineers who should possess at least Higher National Certificate in Electrical Engineering or equivalent qualifications.

Salary is £940/£1,215 per annum (London area), £890/£1,215 per annum (outside London area). Designation is Fourth Assistant Engineer (Technical). National Joint Board conditions of service.

Applications giving details of age, qualifications, experience, etc., should be sent to the Personnel Officer, Central Electricity Generating Board, Central Electricity Hse, Lower Ham Rd, Kingston upon Thames, Surrey, to arrive by 15 Sept., 1961 (C 59)

CENTRAL ELECTRICITY GENERATING BOARD

North Eastern Region

APPLICATIONS are invited from suitably qualified engineers for the following appointments in the Technical Branch of the Regional Electrical Department.

(1) ONE THIRD ASSISTANT ENGINEER

(PROTECTION)

Grade 8, Class K (£1,145/£1,410 per annum) based on Leeds (Test Laboratory) to undertake testing of complete protective equipments and components and investigate problems arising on equipment in service.

(2) THREE FOURTH ASSISTANT ENGINEERS

(PROTECTION)

Grade 11, Class K (£900/£1,165 per annum), based on Leeds (Test Laboratory) to assist with the work described under Vacancy (1).

(3) ONE THIRD ASSISTANT ENGINEER

(PROTECTION)

Grade 8, Class K (£1,145/£1,410 per annum) based on Leeds (Design Section) to undertake the checking of schematic diagrams, wiring diagrams and specifications for protective and control gear and associated apparatus. Site commissioning experience would be an advantage.

(4) THREE FOURTH ASSISTANT ENGINEERS

(PROTECTION)

Grade 10 or 11, Class K (£980/£1,245 or £900/£1,165 per annum) based on Leeds (Design Section) to assist with the work described under Vacancy (3).

(5) FIVE FOURTH ASSISTANT ENGINEERS

(PROTECTION)

Grade 11, Class K (£900/£1,165 per annum) based on North Tees (2), Leeds, Wakefield and Keadby to assist with testing and commissioning of generators, transformers, switchgear, lines and cables and with the testing, commissioning and maintenance of protective gear and control and indicating equipment for switchgear and transformers.

In all cases experience in a switchgear manufacturer's works would be an advantage.

Forms of application may be obtained from the Assistant Regional Secretary (Personnel), Central Electricity Generating Board, North Eastern Region, 1 Whitehall Rd, Leeds 1, to whom they should be returned to arrive not later than 22 Sept., 1961. (C 27)

Advertisements should be sent to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London, W.C.2, before 10 a.m. on TUESDAY of the week of issue. Official Displayed Advertisements are charged at 46s. per inch, and all other classified advertisements at 3s. 6d. per line. Situations Wanted four insertions at twice the single insertion rate. Fee for Box Number and postage on replies 2s.

CENTRAL ELECTRICITY GENERATING BOARD

West Midlands Division

ASSISTANT ENGINEER (RELIEF)

REQUIRED at Wolverhampton Power Station. N.J.B. service conditions, superannuable appointment, salary within Schedule A, Grade E.9, £825/£940 per annum.

The engineer will be expected to carry out shift relief duties to the Shift Charge Engineer and when not so employed will be available to undertake duties in the maintenance and operation departments. The appropriate grade and shift allowance will be paid when relief shift duties are being performed.

Applicants should have received a sound technical training and appropriate qualifications will be an advantage.

Apply quoting Vacancy Number 229/61 MD on form AE6, available from the Station Superintendent, Wolverhampton Power Station, Commercial Rd, Wolverhampton, to whom they should be returned when completed not later than 18 Sept., 1961. (C 38)

RHODESIA AND NYASALAND

THE Federal Ministry of Education invites applications from men under 50 for the following posts at The Polytechnic, Salisbury:

(1) LECTURER IN ELECTRICAL ENGINEERING

The successful applicant will be required to teach mainly the syllabus of the Telecommunications Technicians' Course of the City and Guilds of London Institute, to organise laboratory facilities and to teach allied subjects as necessary.

The qualifications for this post are a degree in Physics or Electrical Engineering, or corporate membership of the Institution of Electrical Engineers.

(2) ASSISTANT LECTURER IN ELECTRICAL ENGINEERING (THREE POSTS)

The successful applicants will be required to teach craft level courses in Electrical Installations and Electrical Fitting.

Applicants should hold a Higher National Certificate or equivalent. Knowledge of automobile electrics would be an advantage.

(3) LECTURER IN CHEMISTRY, MATHEMATICS AND PHYSICS (THREE POSTS)

The successful applicants will be required to teach to Intermediate level in Chemistry and/or University level, in Maths and Physics, and organise laboratories. The qualifications for these posts are a good Honours Degree in Physics, Mathematics or Chemistry.

Some commercial or engineering experience is desirable.

Candidates need not necessarily have previous teaching experience, but this would be an advantage.

Salary Scales:

Assistant Lecturer: £967 10s x £53 15s—£1,075 x £107 10s—£1,290 x £53 15s—£1,827 10s.

Up to six increments are allowed for experience.

Lecturer: £1,558 15s x £53 15s—£1,935.

Up to four increments are allowed for industrial and/or teaching experience over and above that required as a qualification for entry.

Appointments will be made with effect from 1 Jan., 1962. Service is permanent and pensionable. Passages to the Federation are paid for the officer appointed, his wife and dependent children under 18.

Accommodation is not provided, but there is no difficulty in obtaining it privately in Salisbury. Facilities for the education of children are good, and the climate is agreeable.

Further information and forms of application may be obtained from the Education Liaison Officer, Rhodesia Hse, 429 Strand, London W.C.2. The closing date for applications will be 22 Sept., 1961. (C 48)

CENTRAL ELECTRICITY GENERATING BOARD

West Midlands Division

SHIFT CHARGE ENGINEER

REQUIRED at Ocker Hill Power Station, Tipton, Staffs. N.J.B. service conditions, superannuable appointment, salary within Schedule A, Grade G.7, £1,115/£1,245 per annum, plus 10% shift allowance.

A sound technical training and practical experience in the operation and maintenance of steam generating plant and main switchgear are required. Appropriate qualifications desirable.

Apply quoting Vacancy Number 232/61 MD on form A.E.6, available from the Station Superintendent, Ocker Hill Power Station, Bayley's La, Tipton, Staffs, by 18 Sept., 1961. (C 37)

MIDLANDS ELECTRICITY BOARD

APPLICATIONS are invited for the following superannuable posts:

Birmingham Area

AREA SECRETARY (AREA OFFICE)

Applicants should have considerable experience of administration in a large undertaking in a responsible senior post, and a good working knowledge of electricity legislation and the National Agreements governing rates of pay and conditions of employment of all grades of employees. Duties will also include the provision of all necessary secretarial services, the supervision of education and training and welfare facilities in the Area, the acquisition of property for substations and Service Centres, wayleaves, and property management generally in a densely populated area. Candidates should possess appropriate professional qualifications. Salary: £2,815/£3,040 per annum (N.J.M. Class F, Grade 5). Applications, stating age, experience, qualifications, present position and salary, should be forwarded within seven days to Emil Braathen, Area Manager, Midlands Electricity Board, 14 Dale End, Birmingham 4.

Central Gloucestershire Area

DEMONSTRATOR (FEMALE)

(DEAN FOREST)

Applicants must have a good education and should have a certificate of a recognised Training College and/or the E.A.W. Certificate. Applicants must be prepared to take an active part in the sales organisation and selling experience would be an advantage. Duties include lecture demonstrations in Service Centres and on consumers' premises and advice to consumers on the selection and use of electrical apparatus. Salary: £600/£700 per annum (N.J.C. Grade 1). Apply, by letter, within 14 days, stating age, education, qualifications, training and experience, to Mr S. Raybould, Area Manager, Midlands Electricity Board, Eastern Ave, Gloucester.

Wolverhampton Area

DEMONSTRATOR (FEMALE)

(LICHFIELD)

Applicants must have a good education and should have a certificate of a recognised Domestic Training College and/or the E.A.W. Certificate. Duties include lecture demonstrations in Service Centres and on consumers' premises and advice to consumers on the selection and use of electrical apparatus. Salary: £600/£700 per annum (N.J.C. Grade 1). Apply, by letter, within 14 days, stating age, education and qualifications, training and experience, to Area Manager, Midlands Electricity Board, 83 Darlington St, Wolverhampton.

F. W. CATER,
Secretary.
(C 47)

CIVIL SERVICE COMMISSION

Ministry of Health

ELECTRICAL SAFETY ENGINEER

(MAIN GRADE)

PENSIONABLE post in London for man, normally at least 35 on 1 Sept., 1961, who has achieved corporate membership of the Institution of Electrical Engineers. Honours degree or Dip.Tech. in Engineering an advantage. The post demands specialist knowledge of the problems of safety of electrical installations, equipment and apparatus (particularly where inflammable and explosive gases are present) and of the precautions against static electricity. Experience in the electronics field will be an advantage. Candidates should have had wide and responsible experience of electrical engineering in hospitals or other fields where similar problems arise. Salary scale (Inner London) £1,516/£2,015. Starting salary may be above minimum. Promotion prospects. Write Civil Service Commission, 17 North Audley St, London W.1, for application form, quoting S/5378/61. Closing date: 28 Sept., 1961. (C 35)

CENTRAL ELECTRICITY GENERATING BOARD

South Eastern Region

North Thames Division

APPLICATIONS are invited for the following appointment in the Electrical Department at Divisional Headquarters—Cockfosters (North London).

FOURTH ASSISTANT ENGINEER

(METERING)

(S.V. No. 1538)

Salary: N.J.B. Class J, Grade 9, Scale 9, £1,040/£1,245 per annum, plus London Weighting £50 per annum.

The duties of the successful applicant will be to assist in the commissioning, routine testing and maintenance of bulk supply metering equipment, testing and maintenance of indicating instruments and originating equipment connected with the centralised indication system.

Applicants should have had some experience of such work and should hold the Higher National Certificate in Electrical Engineering, or its equivalent, with qualifications leading to Graduate Membership of the Institution of Electrical Engineers.

The duties will be almost entirely at generating stations and sub-stations, and it would be an advantage if applicants can drive a car.

Applications, quoting Reference S.V. No. 1538, stating age, qualifications, experience and present position should be sent to the Personnel Officer, Central Electricity Generating Board, South Eastern Region, North Thames Division, West Farm Pl, Chalk La, Cockfosters, Barnet, Herts, to arrive not later than 16 Sept., 1961.

F. W. SKELCHER,
Assistant Regional Director.
(C 33)

FALKLAND ISLANDS DEPENDENCIES SURVEY

ELECTRICAL OFFICER

ROYAL RESEARCH SHIP *"SHACKLETON"*

APPLICATIONS are invited for the above post for one tour of one year in the first instance. Salary £900 a year. Uniform Allowance £32. Gratuity £50 at end of each annual commission. Free messing and quarters aboard ship or messing allowance on other occasions.

Candidates, 21-35 years of age, must have experience as ship's electrician. Duties include maintenance of ASEA five-ton crane, electric windlass and capstan, Decca radar, Brown's gyro and Kelvin and Hughes sounding machines.

Successful candidate will be required to take up appointment as soon as possible.

Apply to CROWN AGENTS, 4 Millbank, London S.W.1, for application form and further particulars, stating age, name, brief details of qualifications and experience and quoting reference M2A/51372/EE. (C 39)

CENTRAL ELECTRICITY GENERATING BOARD

South Thames Division

DUNGENESS NUCLEAR POWER STATION

Vacancy Notice No. 237/61.

APPLICATIONS are invited for the under-mentioned appointments at Dungeness Nuclear Power Station.

(a) OPERATION SUPERINTENDENT

The successful applicant will be responsible for the safe and economic operation of the plant in accordance with laid-down policy, and for liaison with other departmental heads and specialists. He will be responsible for the training of all operational personnel and the implementation of the appropriate safety rules. Candidates should have experience of the operation and management of modern power stations and of the control of labour. Experience of the commissioning of new plant would be considered an advantage.

Applicants should preferably be qualified to degree standard or its equivalent.

Experience of the operation of nuclear power stations is not essential as adequate training can be given to the successful candidate.

The salary will be in accordance with the National Joint Board Agreement, Schedule A, Class N, Grade 4, £2,050/£2,235 per annum.

(b) MAINTENANCE SUPERINTENDENT

The successful applicant will be responsible for the complete maintenance of the station in accordance with laid-down policy. He will be responsible for the training of personnel in the Maintenance Department and for liaison with other departmental heads.

Applicants should have wide experience in the administration of a maintenance section, the control of labour and the maintenance of power station plant.

Applicants should preferably be qualified to degree standard or its equivalent.

Experience of the operation and maintenance of nuclear power stations is not essential as adequate training can be given to the successful candidate.

The salary will be in accordance with the National Joint Board Agreement, Schedule A, Class N, Grade 4, £2,050/£2,235 per annum. Applications stating age, experience, qualifications, etc., should be addressed to the Personnel Officer, Central Electricity Generating Board, South Thames Division, Lower Ham Rd, Kingston upon Thames, by 27 Sept., 1961. (C 60)

CENTRAL ELECTRICITY GENERATING BOARD

Midlands Region

East Midlands Division

ASSISTANT ENGINEER

(CONTROL ROOM)

LEICESTER POWER STATION

Vacancy No. 205/61.

APPLICATIONS are invited for the position of Assistant Engineer (Control Room) at Leicester Power Station, Rawdykes Rd, Leicester.

Candidates for this post should be suitably qualified and have had experience in the control room.

Salary will be in accordance with Class G, Grade 13, £715/£805 per annum, of the National Joint Board Agreement, plus £90 per annum allowance whilst engaged on shift duties.

Closing date for receipt of applications: 15 Sept., 1961.

This appointment is pensionable within the terms and conditions of the Electricity Supply (Staff) Superannuation Scheme.

Applications should be submitted on the official form AE6/ACT, which may be obtained from the Station Superintendent and should be returned to him by the date stated.

O. S. WOODS,
Assistant Regional Director.
(C 65)

ELECTRICAL SALES ENGINEER

(A.M.I.E.E. at least)

A new appointment to promote the use of aluminium foil and strip in transformer and magnet windings as well as other applications, requires a man over 30 years of age with sales experience and a knowledge of winding designs. The appointment, which offers plenty of scope, is based on London. Right salary will be paid for the right man. Box No. 8407, Electrical Times. (C 44)

SOUTH OF SCOTLAND ELECTRICITY BOARD

APPLICATIONS are invited for a superannuable position as a

SENIOR ASSISTANT ENGINEER

in the Planning and Economics Section of the Chief Commercial Officer's Department.

The duties will include commercial studies on generation economics, supervision of programmes of utilisation research and the statistical analyses of the data, and the design of bulk supply and retail tariffs.

Applicants should have had experience in the generation and/or distribution sides of an electricity supply organisation and corporate membership of either the Institution of Electrical Engineers or the Institution of Mechanical Engineers is desirable.

Salary: N.J.B., Class K, Grade 3, £1,625/£1,950 per annum.

Applications, quoting reference C14/61, should be submitted on the standard form to the Secretary, South of Scotland Electricity Board, Inverlair Ave, Glasgow S.4, not later than 26 Sept., 1961. (C 45)

SOUTH WESTERN ELECTRICITY BOARD

THIRD ASSISTANT DISTRICT ENGINEER

EXETER

SALARY within Class G, Grade 9, Salary Scale 7, £965/£1,090 per annum, of the N.J.B. Agreement.

The successful candidate will be required to assist generally in planning, operation, maintenance and construction work within the District. He will be employed initially on supervising cable laying and the installation of substation plant, and also be expected to undertake standby duty.

Sound training in the distribution side of the supply industry and experience in operating systems up to 11 kV is essential. Applicants should be competent to supervise labour. Qualifications leading to Corporate Membership of the Institution of Electrical Engineers are desirable, and possession of a current driving licence will be an advantage.

Applications for this post to be made on standard form AE6/ACT, OBTAINABLE BY POSTCARD ONLY, from the District Manager, South Western Electricity Board, 3 Bedford St, Exeter. Closing date for receipt of completed applications is 23 Sept., 1961. (C 66)

TRANSFORMERS (WATFORD) LIMITED

require, due to expansion

SENIOR and JUNIOR

DRAUGHTSMEN

experienced on Power and Distribution transformers. Good salary, plus production bonus. Non-contributory pensions scheme. Excellent working conditions.

Apply, with full particulars:—

Chief Draughtsman, Transformers (Watford) Ltd., Sandown Rd, Watford, Herts.
(C 16)

SOUTH OF SCOTLAND ELECTRICITY BOARD

SHOWROOM MANAGER

APPLICATIONS are invited for the position of Showroom Manager of a large showroom to be opened shortly in Glasgow.

Applicants must have a thorough knowledge of modern sales methods and techniques; a wide and successful experience in retail selling; be capable of controlling a large staff, and must have adequate personal drive and energy.

Experience in the electrical industry would be an advantage, but not essential.

Salary: £1,530/£1,650 per annum. Superannuable.

Apply, giving age, experience, etc., and quoting reference number C.15/61, to the Secretary, South of Scotland Electricity Board, Inverlair Ave, Glasgow S.4, not later than 22 Sept., 1961. (C 53)

Eastern Electricity

Essex Sub-Area

SOUTHEND DISTRICT

FOREMAN—APPARATUS REPAIR DEPARTMENT

173/61.R.

APPLICANTS should be craftsmen skilled in the repair and reconditioning of all classes of domestic and commercial electrical apparatus, reconditioning of cooker hotplates, tinning, welding, brazing and spray painting and should be able to supervise and direct a large staff employed in this work.

Rate of pay: N.J.I.C. Grade 2, Schedule E, £795 per annum.

Apply by letter to W. E. Wardrop, ASSOCIATE I.E.E., Commercial Officer, Eastern Electricity Board, 81-85 High St, Brentwood, Essex, by 22 Sept., 1961.

Norfolk Sub-Area

GREAT YARMOUTH DISTRICT

SENIOR DEMONSTRATOR

191/61.R.

Applicants should have had a sound training in Domestic Science and hold a recognised diploma. They should be capable of arranging and giving talks on domestic electrical subjects to women's organisations, school authorities and groups of students.

The duties of the post will include the supervision of staff as necessary and to assist in building the domestic load by studying new housecraft techniques and new electrical appliances and by helping housewives directly and indirectly to select, buy and use efficiently the appliances most suited to their needs.

Salary: N.J.C. 2, £700/£775.

Apply by letter to the Manager, Great Yarmouth District, Eastern Electricity Board, Electric Hse, Regent Rd, Great Yarmouth, Norfolk, by 22 Sept., 1961.

THIRD ASSISTANT ENGINEER

AREA METER TESTING STATION

NORWICH

192/61.N.

Applicants should possess technical qualifications to Higher National Certificate standard and should have a sound experience of modern repair techniques for all makes and types of meters including prepayment meters. They should also have had experience in supervising the testing of single-phase meters.

Duties will include the supervision and control of the repair section at the Norwich Meter Testing Station, which deals with all types of single- and three-phase meters, time switches and instruments.

Salary: N.J.B. Class K, Grade 11, £1,040/£1,165.

Apply by letter to the Manager, Norfolk Sub-Area, Eastern Electricity Board, 4 Duke St, Norwich, Norfolk, NOR.23A., by 22 Sept., 1961. (C 71)

TO ALL ELECTRICAL DESIGN ENGINEERS AND DRAUGHTSMEN

We are shortly moving into a new modern office building and have vacancies for Design Engineers and Draughtsmen who are interested in installation design in all classes of industrial and commercial buildings, including

AIRPORTS—NEW HOSPITALS—HOTELS—
OFFICE BLOCKS—UNIVERSITIES—SCHOOLS

both at home and abroad.

Spring and summer holidays, pension scheme and luncheon vouchers.

Apply in writing, stating age, experience, qualifications, present salary and salary required, to:

J. ROGER PRESTON AND PARTNERS,
15 North Audley Street,
London W.1.

(C 26)

JAMES BOOTH ALUMINIUM LIMITED

have immediate vacancies for:

JUNIOR ELECTRICAL ENGINEERS, having H.N.C. or Grad. I.E.E. as minimum qualifications, with experience either of heavy rolling mill drives or of factory distribution systems, including 11 kV equipment and conversant with schematic diagrams and contractor equipment.

ELECTRICAL DRAUGHTSMEN, having O.N.C. as minimum qualification, with experience of installation and distribution drawings and capable of developing schemes from schematic diagrams.

Apply with full details, etc.:

The Engineering Director,
JAMES BOOTH ALUMINIUM LIMITED,
Argyle Street,
Nechells,
Birmingham 7.

(C 21)

BRITISH INSULATED CALLENDER'S (SUBMARINE CABLES) LTD.

require an

ELECTRICAL ENGINEER

to undertake development work on Submarine Power Cables and Accessories. The selected candidate will be required to organise and progress the development work up to production against customers' requirements. Applicants should hold an Engineering Degree, H.N.C. or its equivalent and preferably have a knowledge of power cable design and manufacture.

Staff Pension Scheme.

Canteen and Social Club facilities.

Applications should be addressed to the Secretary, British Insulated Callender's (Submarine Cables) Ltd., Trafford Pk, Manchester 17.

(C 23)

NUCLEAR CHEMICAL PLANT LIMITED

require and ASSISTANT ELECTRICAL DESIGN ENGINEER with H.N.C. Electrical minimum qualifications. Duties will include the preparation of basic schemes for power distribution, lighting, motor control, process heating and electrical control systems and the production with the aid of draughting staff of working drawings and specifications for novel chemical plant installations. Experience in estimating and supervision of installation work would be advantageous. Good salary and working conditions. Pension Scheme.

Apply: giving brief details to:

Nuclear Chemical Plant Ltd.,
105-113 The Broadway,
West Ealing, W.13.

(C 42)

Delapena

SPECIALIST ENGINEERS IN PRECISION HONING AND INDUCTION HEATING

CHIEF ELECTRICAL INSPECTOR TESTER

To be responsible for all electrical inspection and testing to Design Dept. Specifications of R.F. induction heating generators and handling equipment, honing machines, jigs and fixtures.

Applicants should preferably be of H.N.C. standard, though applications from men of proved ability without this qualification will be considered.

The work involves the control of a small staff and offers interest for a man with initiative. The appointment commands an attractive salary with staff status. Non-contributory pension scheme in operation.

Apply **General Manager,** (C 73)

DELAPENA & SON LTD.

Zona Works, Russell Place, CHELTENHAM GLOUCESTERSHIRE

UPC

OPERATIONS ENGINEERS
and
ASSISTANT OPERATIONS ENGINEERS

The United Power Co. recently formed to amalgamate the interests of ATOMIC POWER CONSTRUCTIONS LTD. and G.E.C.—SIMON-CARVES ATOMIC ENERGY CO. LTD. have vacancies for qualified engineers, who have had operation experience of power station plant, or large industrial plant. This work will be initially in the London area, followed by work at Trawsfynydd and Hunterston Nuclear Power Stations. Experience of nuclear power plants will be an advantage, although training in nuclear techniques will be given where necessary.

These positions are pensionable and carry good prospects of promotion within the Company. Salaries will be commensurate with the responsibilities involved and allowances paid on transfer to site.

Applications giving full details should be addressed to:

The Personnel Manager (Ref. ET/198),
P.O. Box 90,
28 Theobalds Rd,
London W.C.1. (C 50)

TESTERS

Senior and Junior Electrical Testers required. For the senior position testing experience of transformers and qualifications to O.N.C. essential; and for junior a good electrical engineering background.

Apply: **Chief Engineer, Power Division, Gresham Lion Group Ltd., Twickenham Rd, Hanworth, Middx.**

(C 49)

THIRD ASSISTANT ENGINEER (ELECTRICAL)

required at

WIRRAL DISTRICT OFFICE
PRENTON, BIRKENHEAD

Salary Range: £1,145/£1,410.

The successful applicant will assist the Planning Engineer in the co-ordination of all District work. Duties include preparation of weekly work programmes, stores control, plant records, transport, job methods.

Applicants should have a thorough knowledge of high voltage transmission plant and associated spares, stores control and work methods. Possession of appropriate technical qualification would be an advantage.

Applications in writing to:

PERSONNEL OFFICER,
Central Electricity Generating Board,
825 Wilmslow Rd, East Didsbury,
Manchester 20.

Quoting Vacancy No. 231/130/E.
Closing date: 14 Sept., 1961.

(C 32)

THE ENGLISH ELECTRIC CO. LTD.

FRACTIONAL HORSE-POWER MOTOR DIVISION

ENGLISH ELECTRIC invite applications for appointments to the outside sales staff specialising in sale of fractional horse power motors in a number of Branch territories, including the London area.

Qualified engineers already experienced in this field and engineers who feel that they have qualifications which would enable them to succeed in this field are invited to submit details of their experience and training, together with relevant personal data to Mr G. M. Smith, Dept. G.P.S., English Electric House, Strand, London W.C.2, quoting reference number ET/0097A.

(C 20)

Due to expansion the

CONTROL GEAR DIVISION OF G.W.B. FURNACES LTD.

require additional

ELECTRICAL ESTIMATORS

at their Dudley Works. Applicants must be capable of analysing customers' requirements, preparing circuit diagrams and composite tenders. No electronics involved. Technical qualifications to H.N.C. standard preferred. Possibility of eventual promotion to outside Sales Staff for men of the right personality.

The Works are situated in pleasant surroundings, and assistance with removal expenses will be given in approved cases.

Detailed applications, in confidence, which will be acknowledged, to Sales Manager, Control Gear Division, G.W.B. Furnaces Limited, P.O. Box No. 4, Dibdale Works, Dudley, Worcs.

(C 30)

YORKSHIRE ELECTRICITY BOARD

Applications are invited for the post of SUB-AREA MANAGER in each of the following:

No. 3 (Sheffield) Sub-Area (E.10, £3,765/£4,020 per annum).

No. 2 (Huddersfield) Sub-Area (C.10, £3,270/£3,515 per annum).

No. 7 (Grimsby) Sub-Area (B.10, £3,040/£3,270 per annum).

Applicants, who should have extensive knowledge of the industry and a wide experience in the organisation of large units of electricity supply, should state age and full details of qualifications and experience and should also indicate the appointment or appointments for which they wish to be considered.

Applications should be sent to the Secretary, Yorkshire Electricity Board, Wetherby Rd, Scarcroft, Leeds, not later than Friday, 29 Sept., 1961.

(C 36)

A PATENT & INFORMATION OFFICER

is required to combine the duties of administering the Company's patent procedures and maintaining a technical library and information service.

The successful candidate is most likely to be a man having at least the H.N.C. in Electrical or Mechanical Engineering, together with a sound knowledge of patent procedures. A knowledge of German and/or French would be a distinct advantage.

This is a permanent appointment and employment benefits include membership of generous non-contributory Life Assurance and contributory Pension Schemes.

Please apply, giving the fullest details of qualifications, positions held and salaries, etc., to the Personnel Manager

THE

RHEOSTATIC

COMPANY LIMITED

Slough Bucks

(C 43)

ROLLS-ROYCE

HAVE A VACANCY FOR A PLANT SUPERINTENDENT

for the operation and maintenance of a large electro-mechanical plant used for altitude testing of aero gas-turbine engines at Derby.

The facility comprises six 20,000 h.p. motor compressor sets, cooling and regeneration turbines, large heat exchangers, refrigeration plant, cooling towers, electro-hydraulic and pneumatic control systems and other ancillary services. The total installed h.p. is 150,000 with a supply voltage of 33,000 V.

Only chartered Electrical Engineers with considerable experience of similar plant should apply. The post carries a high degree of responsibility and the starting salary will be not less than £1,750 per annum.

Candidates should write for an application form to the

MANAGER,
TECHNICAL ADMINISTRATION,
ROLLS-ROYCE LIMITED,
P.O. BOX 31,
DERBY

(C 31)

CENTRAL ELECTRICITY GENERATING BOARD

Western Division

Applications are invited for the following appointments at the PORTISHEAD "B" POWER STATION, PORTISHEAD, SOMERSET.

FITTERS—ELECTRICAL AND INSTRUMENT MECHANICS

Applicants should have served a recognised course of training or apprenticeship and for the Instrument Mechanics position, experience in the maintenance of recording and indicating instruments, automatic boiler control equipment and turbovisory gear as installed in modern power station plant would be an advantage.

Rate of pay is 5s 6½d per hour. Canteen facilities.

The conditions of service will be in accordance with the N.J.I.C. Agreement for the Electricity Supply Industry, and good sick pay and holiday schemes are in operation together with a Voluntary Superannuation Scheme.

Application should be made on Form A.E.6/M obtainable from the Station Superintendent, Portishead Power Station, Portishead, Somerset, and should be returned to him by 18 Oct., 1961.

(C 62)

YORKSHIRE ELECTRICITY BOARD

No. 2 (Huddersfield) Sub-Area

HUDDERSFIELD DISTRICT

CONSUMERS' ENGINEER

APPLICANTS should be technically trained and have good general experience on utilisation, wiring installations and metering. They should also have experience in the negotiation of supples and in the application of tariffs for domestic, commercial and industrial purposes.

Salary: N.J.B. Class J, Grade 7 (Scale 11), £1,275/£1,410 per annum.

Applications, together with the names of two referees, should be sent to the Manager, Yorkshire Electricity Board, No. 2 (Huddersfield) Sub-Area, Market St, Huddersfield, not later than 21 Sept., 1961.

No. 3 (Sheffield) Sub-Area

ROTHERHAM/MEXBOROUGH DISTRICT

SPECIALIST SALES REPRESENTATIVE

Applicants will be required to give advice to commercial caterers, fish fryers and the like with the object of securing commercial catering and refrigeration load; and to give non-technical assistance to the Assistant Engineer (Consumers) in the development of this load.

The possession of the E.D.A. Salesmanship Certificate will be an advantage.

The successful candidate will normally be located at Rotherham, but will be required to work throughout the District as occasion demands.

Salary: N.JC. Grade 3, £780 x £25—£880 per annum.

Applications, together with the names of two referees, should be sent to the Manager, Yorkshire Electricity Board, No. 3 (Sheffield) Sub-Area, Commercial St, Sheffield, not later than 21 Sept., 1961. (C 64)

KENYA GOVERNMENT

INSPECTORS OF WORKS (ELECTRICAL)

REQUIRED for two tours of 24/27 months in first instance. Salary according to age and experience in scale (including Inducement Pay) rising to £1,473 a year. Gratuity 25% of total salary drawn. Children's education allowances. Outfit allowance £40. Free passages. Liberal leave on full salary.

Candidates under 45 years of age must have served full apprenticeship and have had five years' subsequent experience in the service of a substantial industrial or contracting business organisation.

Apply to CROWN AGENTS, 4 Millbank, London S.W.1, for application form and further particulars, stating age, name, brief details of qualifications and experience and quoting reference M2A/51133/EE. (C 40)

CENTRAL ELECTRICITY GENERATING BOARD

North Eastern Region

FOURTH ASSISTANT ENGINEERS

(SUBSTATIONS)

APPLICATIONS are invited from Engineers to supervise the work of contractors engaged on the installation of transformers, switchgear, cables and associated equipment at Transmission Substations.

Previous experience of this work is desirable but not essential.

Varied and interesting developments are taking place in the Region on the introduction of the 400 kV system which candidates will in time be expected to supervise.

Preference will be given to candidates who possess or are completing qualifications leading to Corporate Membership of the I.E.E.

The salary for the appointment will be in accordance with the National Joint Board Agreement, Grade 11, Class K (£900/£1,165 per annum).

Forms of application may be obtained from the Assistant Regional Secretary (Personnel), Central Electricity Generating Board, North Eastern Region, 1 Whitehall Rd, Leeds 1, to whom they should be returned to arrive not later than 29 Sept., 1961. (C 72)

J. & P.

SENIOR SALES ENGINEER

required

IN EDINBURGH AND EAST SCOTLAND

Johnson and Phillips Ltd. have a vacancy at their Edinburgh branch for a SENIOR SALES ENGINEER to handle the sales of capacitors, switchgear and transformers. This is a permanent and responsible appointment with scope for advancement and for which a car will be provided.

Applications are invited from Chartered Electrical Engineers or men with H.N.C. in electrical engineering. Applications giving details of experience and training should be addressed to the Employment Manager, Johnson and Phillips Ltd., Charlton, S.E.7. (C 75)

SOUTHERN ELECTRICITY BOARD

ASSISTANT ENGINEER (PLANNING)

BOURNEMOUTH District of No. 4 (Bournemouth) Sub-Area. Salary: N.J.B. Class J, Grade 9 (£1,115/£1,245 per annum). N.J.B. Conditions of Service.

The successful candidate will be required to assist the Planning Engineer in the preparation of schemes and estimates for extensions of, and reinforcement to, overhead and underground H.V. and L.V. networks. Applicants should have had sound experience in Electricity Supply Distribution, and the possession of suitable technical qualifications would be an advantage. The successful candidate will be required to carry out standby duties if and when called upon to do so.

The successful candidate will be required to contribute to the Electricity Supply (Staff) Superannuation Scheme, if eligible.

Applications on forms obtainable from the Sub-Area Secretary, 1 Priory Rd, Bournemouth, and returned to him, quoting Z.1401, not later than 18 Sept., 1961. (C 55)

THE NORTH WESTERN ELECTRICITY BOARD

SECOND ASSISTANT ENGINEER

DESIGN SECTION

SUB-AREA ENGINEERING DEPARTMENT

OLDHAM

APPLICANTS should be qualified engineers and have wide experience in the planning and design of modern systems. The duties will mainly consist of the long-term planning and engineering development of major schemes involving 33 kV, 11 kV and 6 kV networks. Preference will be given to applicants who are Corporate Members of the Institution of Electrical Engineers.

Salary Scale: £1,535/£1,720 p.a. Grade L.6. N.J.B. Conditions.

Applications on forms to be obtained from the Manager, No. 3 Sub-Area, The North Western Electricity Board, Union St, Oldham, and returned to him by 30 Sept., 1961.

FOURTH ASSISTANT ENGINEER

SUB-AREA ENGINEERING DEPARTMENT

BLACKBURN

Applicants should be experienced in the planning and construction of low, medium and high voltage overhead and underground systems. Preference will be given to applicants who hold the H.N.C. in Electrical Engineering.

Salary Scale: £965/£1,090 p.a. Grade L.13. N.J.B. Conditions.

Applications on forms to be obtained from the Manager, No. 5 Sub-Area, The North Western Electricity Board, Jubilee St, Blackburn, and returned to him by 16 Sept., 1961. (C 54)

THE NORTH EASTERN ELECTRICITY BOARD

Tees Sub-Area

APPLICATIONS are invited from suitably qualified engineers for the appointment of

FIRST ASSISTANT DISTRICT COMMERCIAL ENGINEER

DARLINGTON

Applicants should have experience in the utilisation of electrical energy in commercial and domestic premises, a knowledge of installation work and be conversant with tariffs, sales and all aspects of consumers service.

Salary: Schedule A, Class G, Grade 5, £1,275/£1,410 per annum. N.J.B. Conditions of Service.

Applications stating age, qualifications and experience to be received by Assistant Secretary (Establishments), The North Eastern Electricity Board, G.P.O. Box No. 117, Carliol Hse, Newcastle upon Tyne 1, within ten days of the appearance of this advertisement. (C 63)

CENTRAL ELECTRICITY GENERATING BOARD

South Wales Division

APPLICATIONS are invited for the following superannuable N.J.B. Schedule A appointments in the South Wales Division:

ASSISTANT SHIFT CONTROL ENGINEER

USKMOUTH "A" AND "B" POWER STATIONS

WEST NASH, nr. NEWPORT, MON

Vacancy No. 255/ET/61.

Salary: Class M, Grade 12, Scale 9, £1,115/£1,245 per annum, plus 10% shift allowance.

Applicants should possess H.N.C. or equivalent qualifications and have had operating experience in a modern power station.

SECOND ASSISTANT ENGINEER

(OPERATION)

GENERATION DEPARTMENT

DIVISIONAL HEADQUARTERS

CARDIFF

Vacancy No. 256/ET/61.

Salary: Class J, Grade 5, Scale 13, £1,395/£1,610 per annum.

Applicants should possess a Higher National Certificate or equivalent qualifications and should have had experience of generating plant maintenance including the programming of plant overhauls.

Special application forms obtainable from Divisional Secretary, South Wales Division, Central Electricity Generating Board, Twyn-y-fedwen Rd, Gabalfa, Cardiff, to be returned by 23 Sept., 1961. (C 56)

CENTRAL ELECTRICITY GENERATING BOARD

Southern Division

South Western Region

FOURTH ASSISTANT ENGINEER

(OPERATIONAL RESEARCH)

GENERATION DEPARTMENT

SEC/3.167

THE work of the section involves investigation of engineering problems at generating stations throughout the Division and the application of specialised techniques in operational research to improve the effective use of plant and manpower.

Candidates should preferably possess an appropriate professional qualification and have had some operating experience in a generating station.

Previous experience in operational research would be an advantage, but it is not essential since opportunities for training will be given.

Salary: N.J.B. Class J, Grade 11, £890/£1,090 per annum.

Special application forms (not AE6/ACT) obtainable only from Divisional Secretary, 111 High St, Portsmouth, should be returned by 20 Sept., 1961. (C 57)

APPLICATIONS are invited by Kennedy and Donkin, 12 Caxton St, London S.W.1 (Ref. RFL), for an ASSISTANT in the Cable Department at their Weybridge Office. Applicants must be qualified electrical engineers with experience in design, manufacture and installation of cables for transmission and generation projects. (C 68)

APPLICATIONS are invited for the appointment of a JUNIOR ELECTRICAL ENGINEERING ASSISTANT. Applicants, preferably having served an apprenticeship at a manufacturer's works, should be graduate members of the I.E.E. and have had considerable experience in the installation and operation of light and heavy electrical equipment. Knowledge of radio an advantage. Applications giving full details of age, experience, etc., and salary required, should be addressed to Engineer-in-Chief, The South Staffordshire Waterworks Co., 50 Sheepcote St, Birmingham 15. (C 22)

CONSULTING ENGINEERS require an experienced ELECTRICAL ENGINEER at their Weybridge office to assist in design and contract work associated with large hydro-electric power project. Candidates should preferably have an engineering degree or at least H.N.C. Candidates should submit full details of training and experience to Kennedy and Donkin, 12 Caxton St, London S.W.1. (C 70)

CONSULTING ENGINEERS require an experienced ELECTRICAL ENGINEER to assist in supervision of erection, testing and commissioning of large hydro-electric power project in North Wales. Candidates should preferably have an engineering degree or at least H.N.C. Candidates should submit full details of training and experience to Kennedy and Donkin, 12 Caxton St, London S.W.1. (C 69)

FULLY experienced JOURNEYMEN CABLE JOINTERS required by large electrical company. Applicants would be required to travel to any part of the country. London rates of pay and out allowance. Write stating age and giving brief details of experience to Box No. 8409, Electrical Times. (C 51)

MECHANICAL FITTER/ASSEMBLERS required for assembly of medium and large size On-load Tap Changers for transformers. High piecework earnings possible. Apply personally or in writing to the Works Employment Officer, Fuller Electric Ltd., Fulbourne Rd, Walthamstow, London E.17. LAR 2350. (C 19)

NEWTON BROTHERS (DERBY) LTD. require SALES ENGINEER for employment at their Derby Works.

Applicants must have had sound technical training and previous experience in handling inquiries relating to a.c. d.c. rotating machines and control gear.

Apply giving details of age and experience to the General Manager, Newton Bros. (Derby) Ltd., Alfreton Rd, Derby. (C 25)

SENIOR LABORATORY ASSISTANT (preferably under 30) to be responsible for photometric and thermometric work on lighting fittings and associated problems. Work includes interesting development of techniques and apparatus allied to design of lighting fittings. Knowledge of glass, plastics, electrical circuitry and fundamental problems of vision in artificial light would be helpful. Some personal contact with clients, technical associations and manufacturers will be necessary. Company pension scheme. Salary according to ability and experience (Dip. Member of I.E.S. would be an advantage). Apply fully marking envelope "Confidential" to Technical Director, Holophane Ltd., Scientific Illuminating Engineers, Elverton St, Westminster, S.W.1 (C 18)

Box No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London, W.C.2

SENIOR ELECTRICAL LAYOUT DRAUGHTSMAN required for Consulting Engineers' office. Experienced in the electrical equipment for buildings, etc. Salary £1,050 upwards, according to experience; permanency; pension fund, etc. C. W. Glover and Ptnrs., Consulting Engineers, Francis Hse, Francis St, London S.W.1. (C 24)

FINANCIAL

A SECOND mortgage our speciality; £2 6s 8d monthly repayments on each £100 borrowed. Also 100% Deferred Mortgage; 95% Immediate. Business and Investment Finance, Cranbrook Mortgage Bureau, Department C.H.9, 49 Cranbrook Rd, Ilford 3615 (3 lines). (C12)

APPOINTMENTS WANTED

AUTOMATIC CONTROL GEAR REPRESENTATIVE requires change.—Box 8411, Electrical Times. (C 74)

INSTALLATION ENGINEER, A.M.I.E.E., 45, industrial apprenticeship, 15 years' contracting experience, requires executive position in contracting or consulting. Minimum £1,500 per annum for progressive post.—Box No. 8391, Electrical Times. (C 15)

INDIAN ENGINEER, age 27, First Class Honours Graduate from an Indian University with post-graduate degree from a British University and two years' experience, wishes to be trained as Electrical Engineer, or seeks employment.—Box 8403, Electrical Times. (C 28)

SALE BY AUCTION

By Order of the Receiver, E. C. Baillie, Esq., C.A.

Re: the L.P.S. Electrical Co. Ltd.

PONSWOOD WORKS, THEAKLEN DRIVE, ST. LEONARDS-ON-SEA, Sussex

HENRY BUTCHER & CO.

are instructed to offer for SALE BY AUCTION, in LOTS, at **THE QUEEN'S HOTEL, HASTINGS,** on

Wednesday, 11th October, 1961

AND DAY FOLLOWING at 11 a.m. EACH DAY, the

PLANT, MACHINERY, STOCK & STORES

OFFICE FURNITURE & EQUIPMENT

including **PLASTIC EXTRUDING MACHINES by "Andouart," "Iddon" and "Shaw." HIGH SPEED TUBULAR STRANDING MACHINES. BUNCHING, LAPPING AND WINDING MACHINES. HEAVY LAYING UP MACHINES. PNEUMATIC INJECTION MOULDERS. COMPLETE PLANT FOR THE MANUFACTURE OF TINSEL CONDUCTORS. WINDING, COILING AND REELING MACHINES. FINE WIRE BINDING MACHINES. MOTORISED BRAIDING MACHINES. INJECTION MOULDERS. Telephone Cord Plaiting and Binding Machines. Wrapping Machines. Tagging Presses. Steel Bins and Racks. Reels and Drums. LACQUERING MACHINES. FINE WIRE WELDERS. S.S. & S.C. AND CAPSTAN LATHES. DRILLING, GRINDING, MILLING AND SHAPING MACHINES. Air Compressors. Electric Motors. Engineers' Stores. Pumps. Electric Hoists. ELECTRICAL TEST EQUIPMENT. STOCK OF FINISHED AND PARTLY COMPLETED ELECTRIC CABLE, COPPER WIRE, TEXTILES AND STORES. OFFICE FURNITURE AND MACHINERY including "Adrema," "Comptometer," "Frieden," "Facit," "Gestetner," "Simplex," "Eliot Fisher" and "Remington" Machines.**

Catalogues (when ready) may be obtained of:

Messrs LAYTON-BENNETT, BILLINGHAM and Co., Chartered Accountants, 23 Blomfield Street, London Wall, London, E.C.2, and of

Messrs HENRY BUTCHER and Co., Auctioneers, Valuers and Surveyors of Factories, Plant and Equipment, 73 Chancery Lane, London, W.C.2. Telephone: HOLborn 8411 (eight lines)

(C 76)

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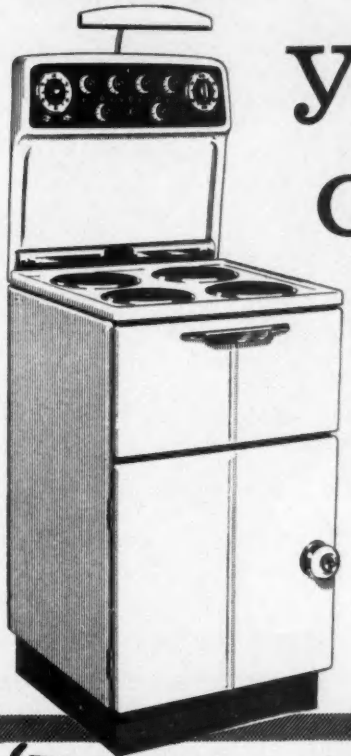

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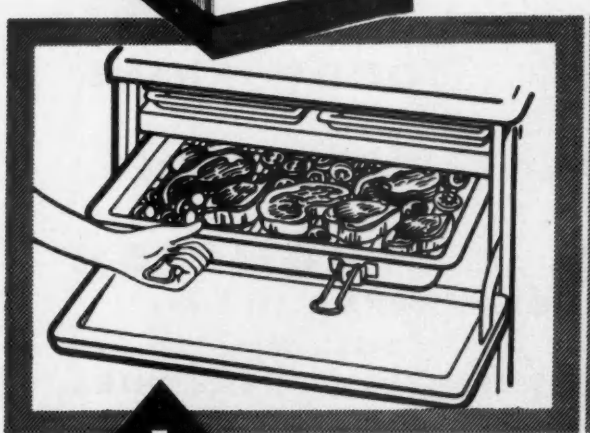

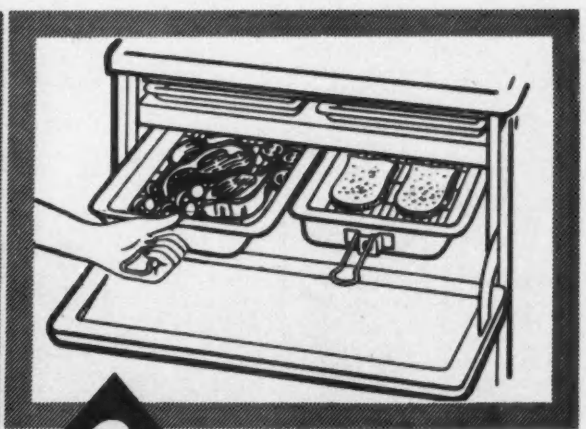

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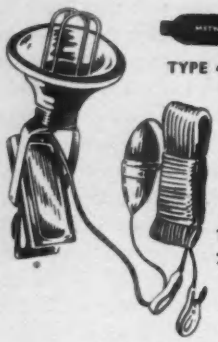

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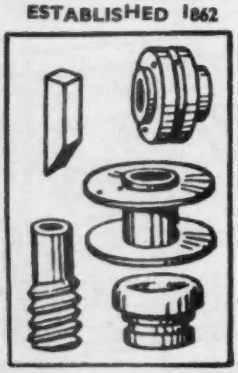

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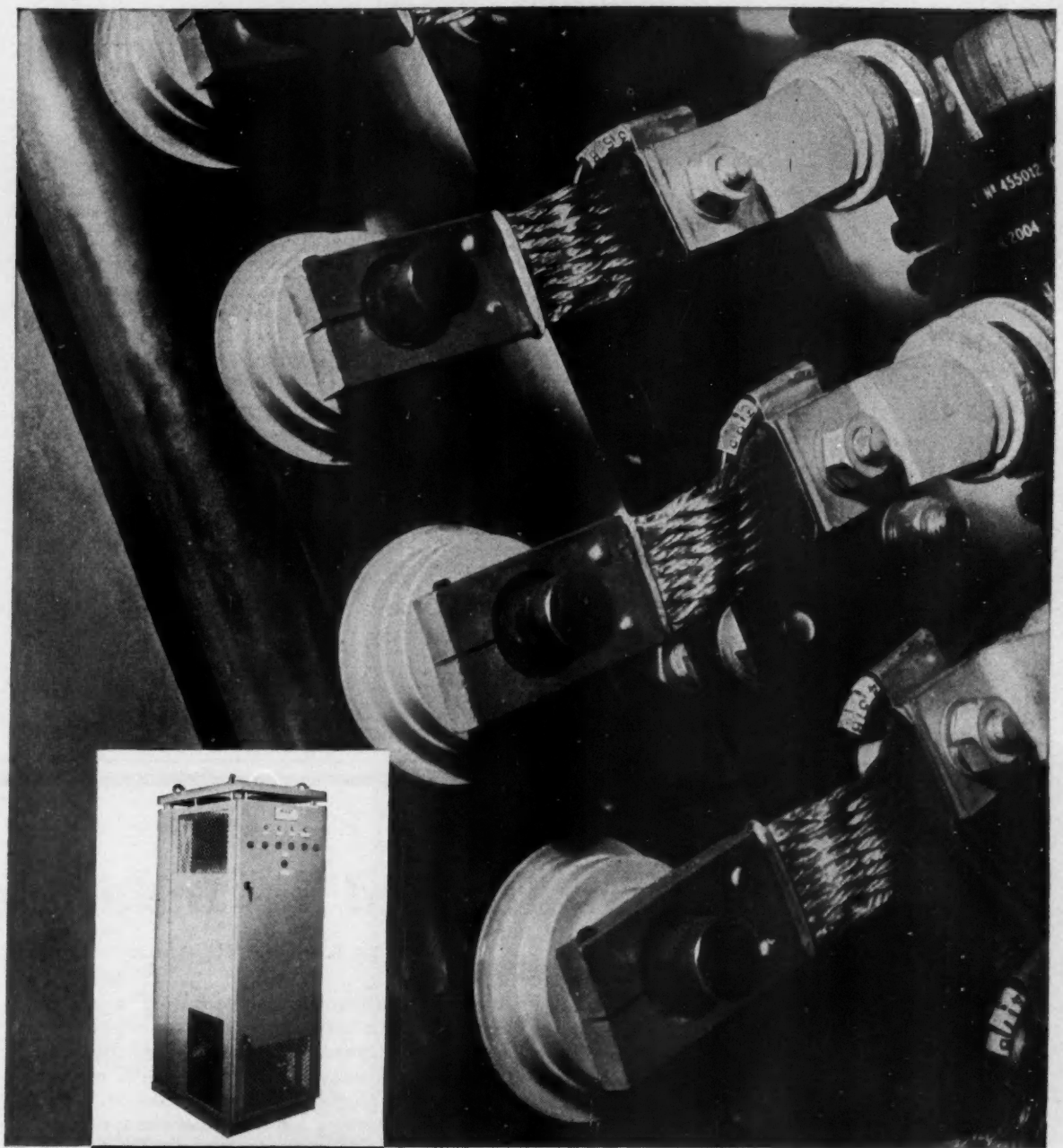

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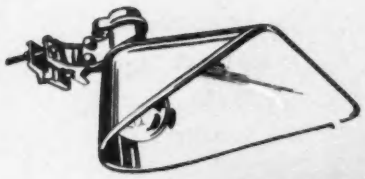

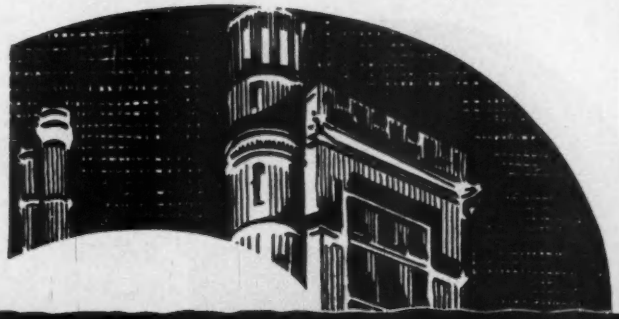

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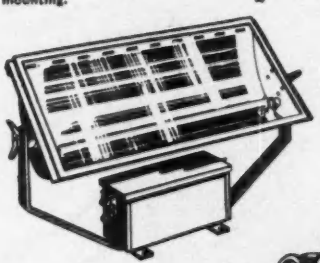

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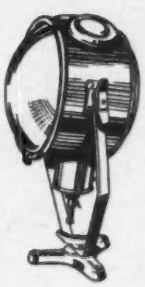

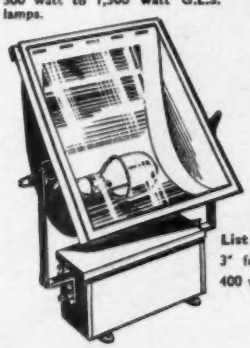

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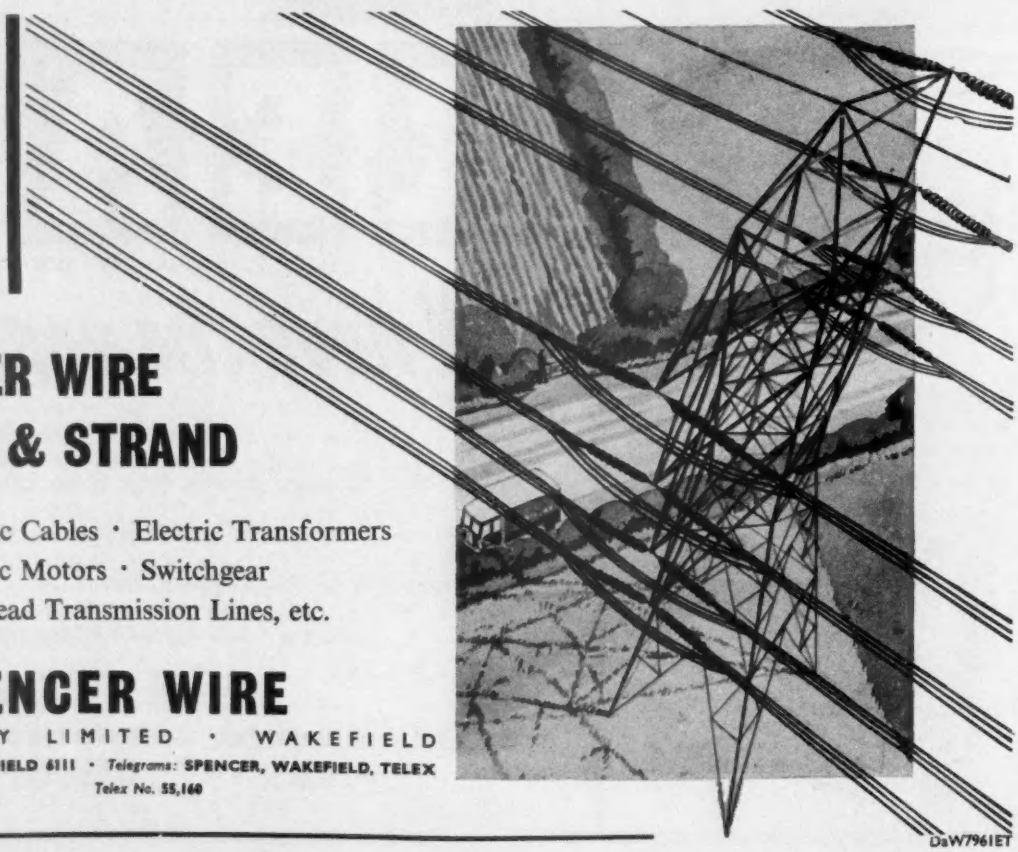

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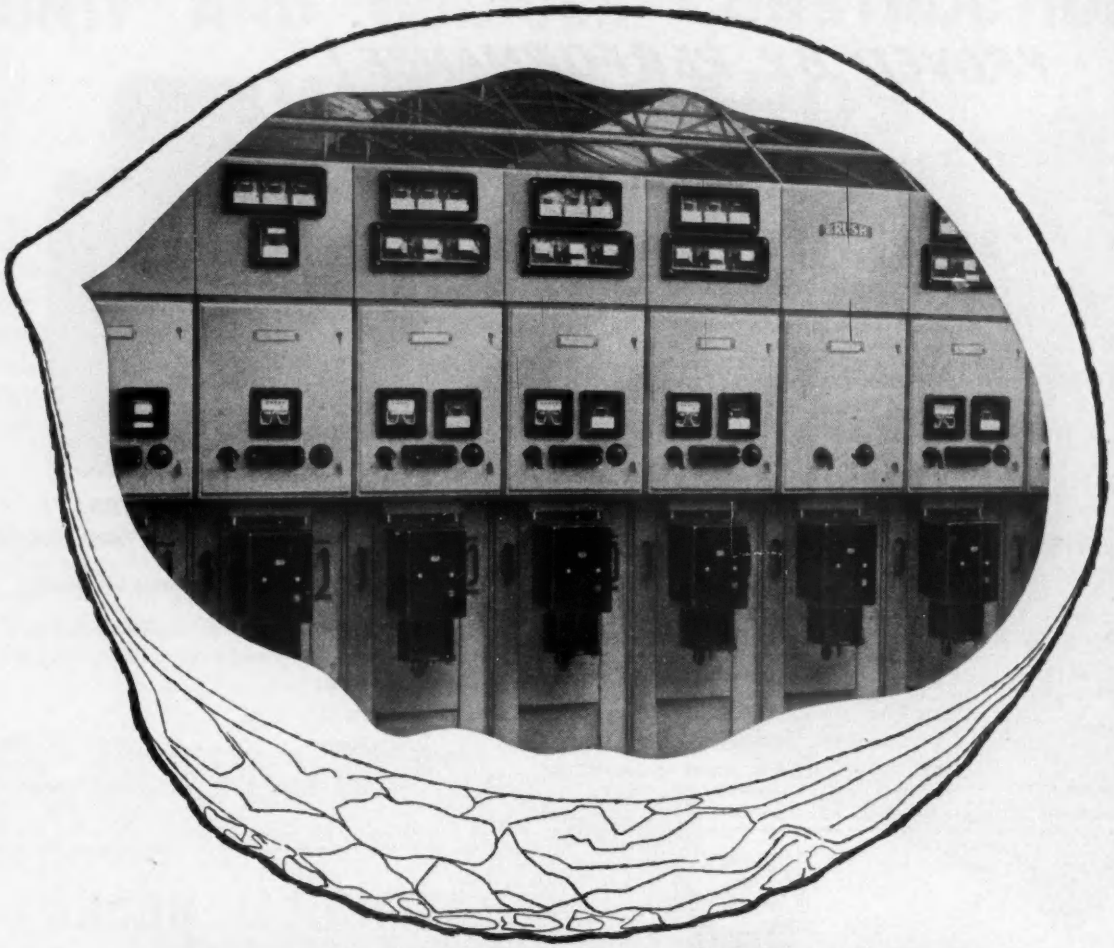

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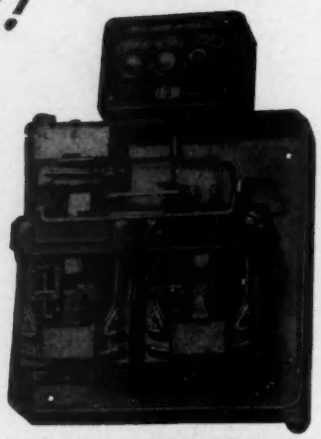

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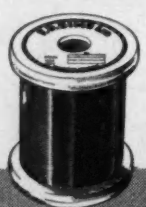

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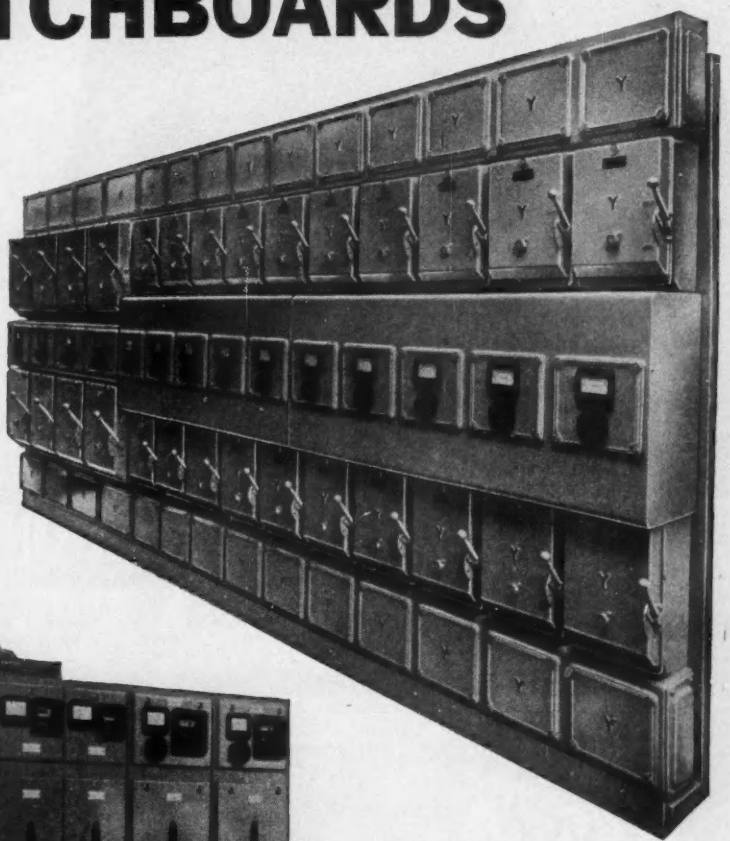

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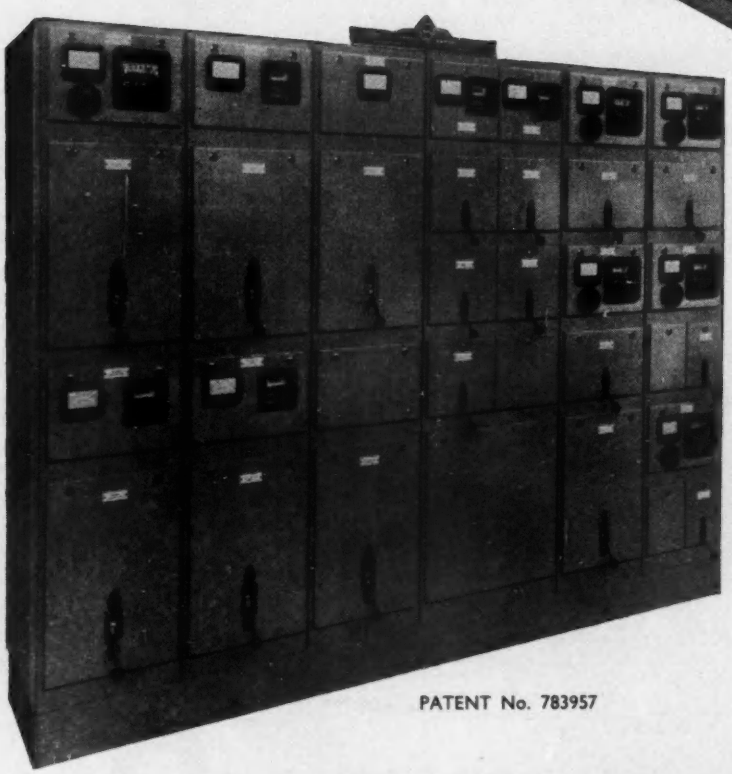

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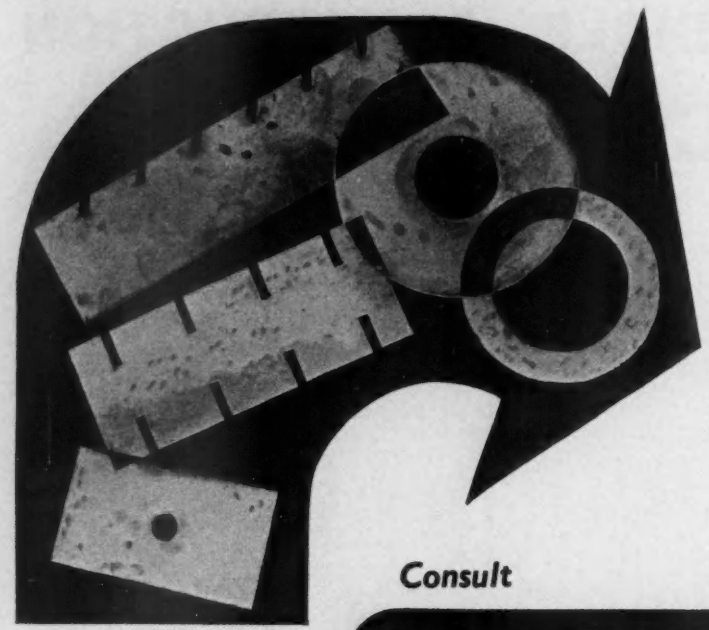

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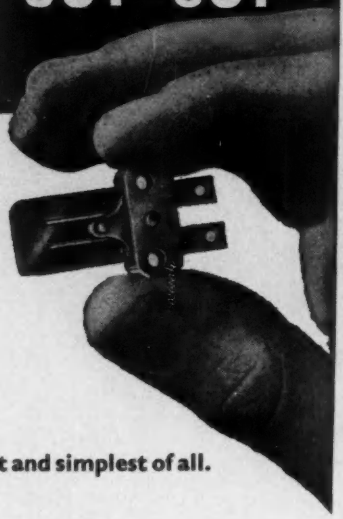

World Patents including Patent Numbers 600855, 622781, 624985, 657434, 713443, 749716, 774911, 782668, and others. Also other patents pending.

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* Has only one moving part.
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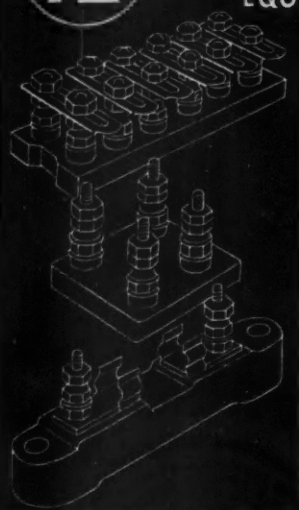

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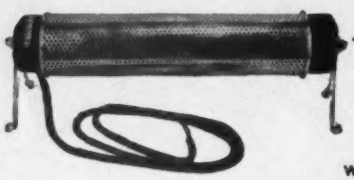

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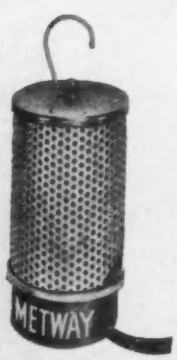

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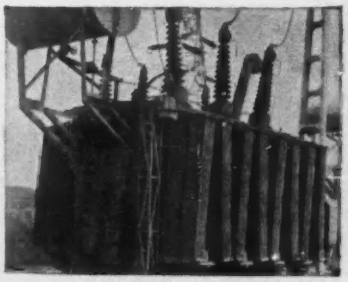
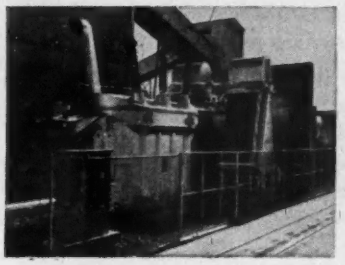
One of two PARSONS 25 MVA transformers at Andujar sub station Madrid.



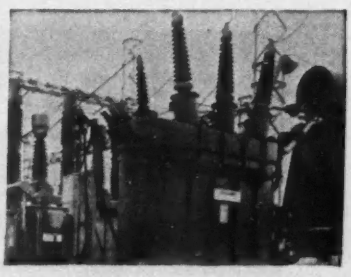


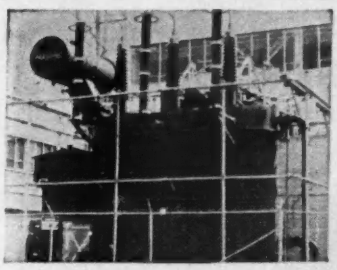
AUSTRALIA

One of three PARSONS 37.5 MVA 11.8/140.8 kV Generator transformers at Bunbury, Western Australia

SOUTH AFRICA

One of two PARSONS 45 MVA 132/88 kV Auto transformers at Caedmore, Natal



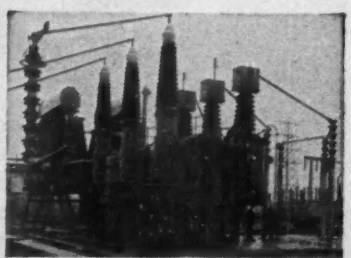


CANADA

One of two PARSONS 75 MVA 14.4/138 kV Generator transformers at Boundery Dam.

ENGLAND

One of two PARSONS 180 MVA 132/275 kV Auto transformers at Keadby.



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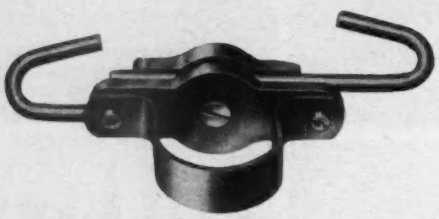

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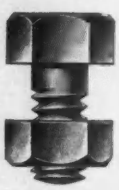

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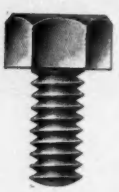

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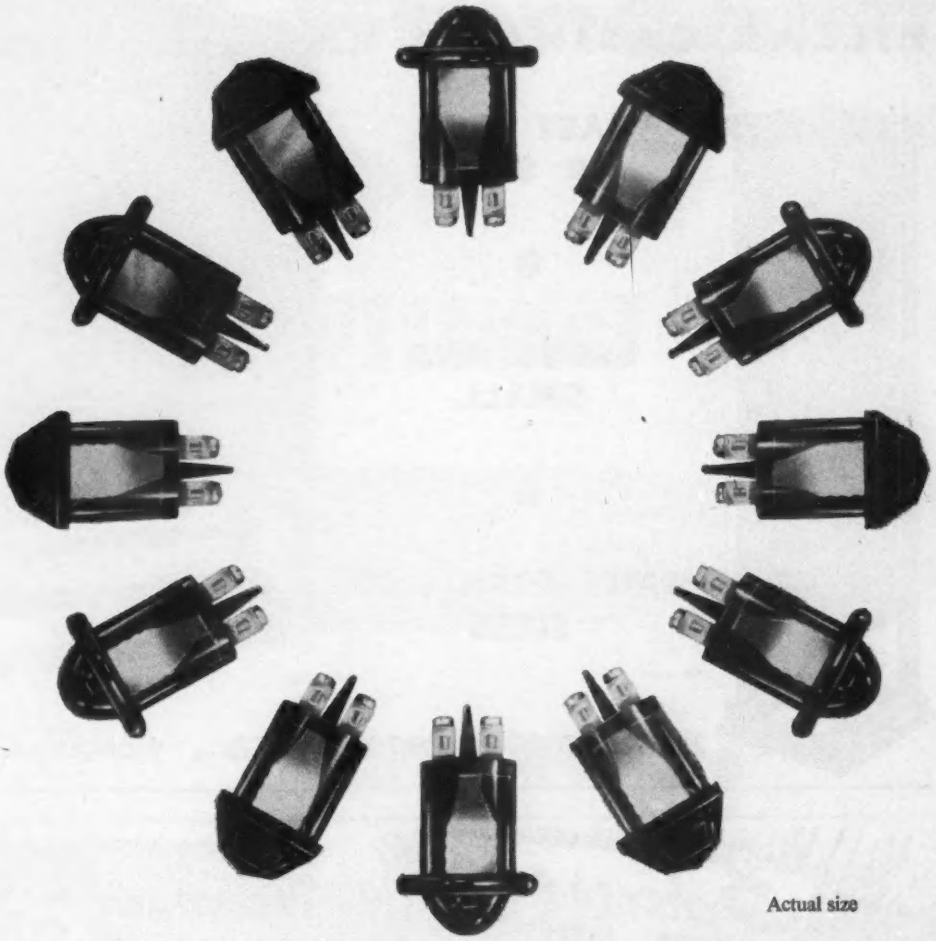

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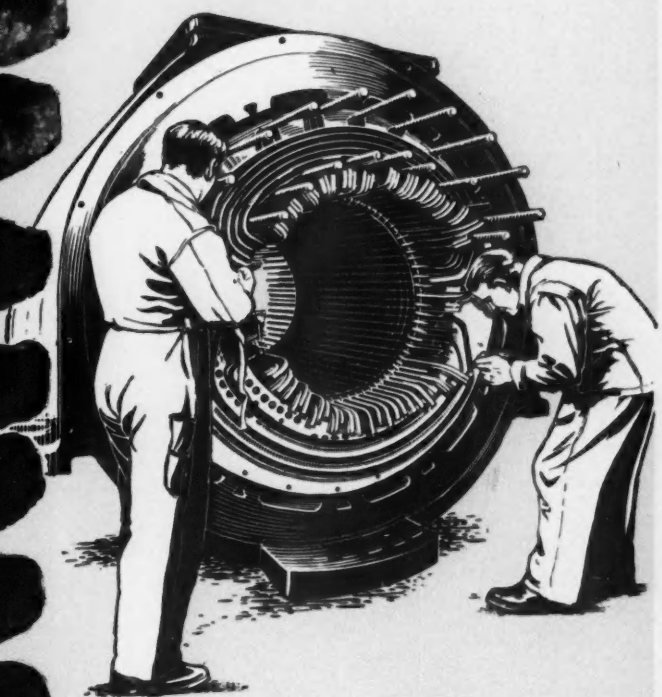

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